INC

JAA78271-R.3598.A

作成承認印	配布許可印
ニコン映像カンパニー CS推進部 GM	サービス 計画課 M

AF-S VR Zoom-Nikkor
ED 24-120mm f/3.5-5.6G IF

REPAIR MANUAL

Nikon | NIKON CORPORATION
Tokyo, Japan

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SPECIFICATIONS

Type of lens	G-type AF Zoom- Nikkor lens having built-in CPU and Nikon bayonet mount
Focal length	24mm-120mm
Maximum aperture	f/3.5-f/5.6
Lens construction	15 elements in 13 groups (2 aspherical lens and 2 ED lens elements)
Picture angle	84°-20°30′(71°-16°20with IX 240 system cameras, 61°-13°20′with Nikon Digital Camera D1/D1H/D1X/D100)
Focal length scale	24,28,35,50,70,85,120mm
Distance information	Output to camera body
Zoom control	Manually via separate zoom ring
Focusing	Nikon Internal Focusing (IF) system (utilizing an internal Silent Wave Motor); manually via separate focus ring
Shooting distance scale	Graduated in meters and feet from 0.5m (2ft.) to infinity (∞)
Closest focus distance	0.5m (1ft.) at all zoom settings
Diaphragm	Fully automatic
Aperture range	f/3.5 to f22 (at 24mm), f5.6 to 36 (at 120mm)
Exposure measurement	Via full-aperture method with cameras having CPU interface system
Attachment size	72mm (P ＝ 0.75mm)
Dimensions	Approx. 77mm dia. ×94mm extension from the camera's lens mount flange (min. length at 24mm focal length)
Weight	Approx.575g (20.3 oz)

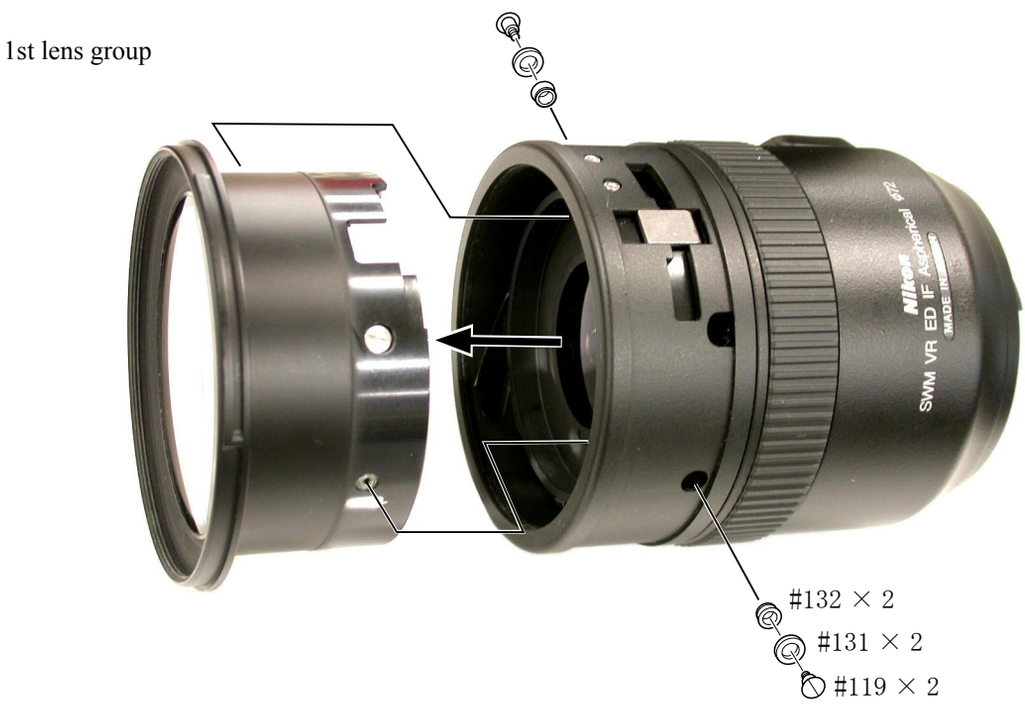
※ Before disassembly/reassembly/adjustment

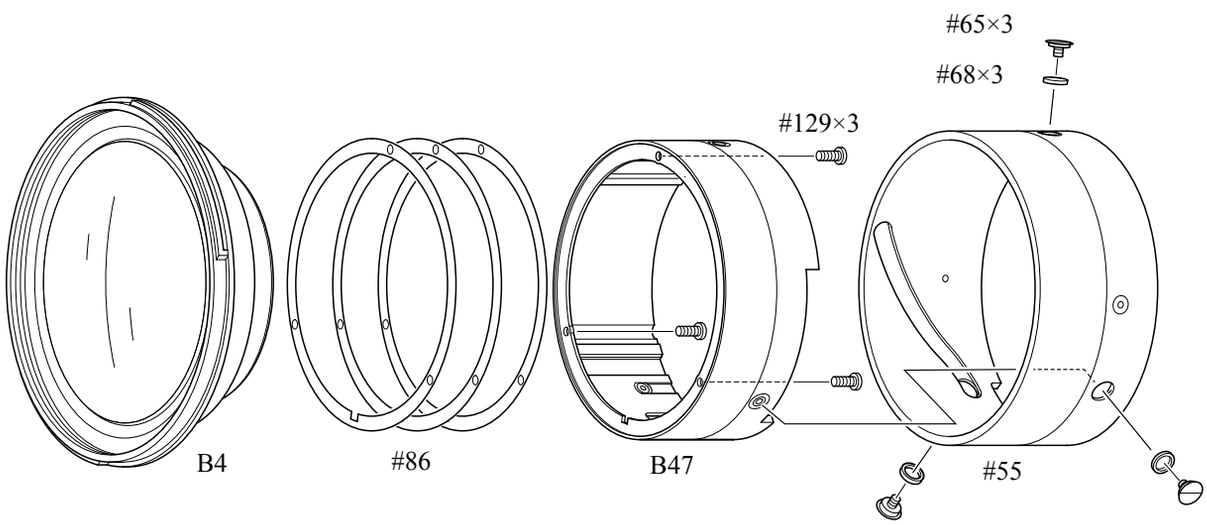
To get the picture blur compensation to work, the VR (vibration-reduction) unit is mounted on this lens.
In case of detaching the VR (vibration-reduction) unit and gyro base plate, be sure to adjust the VR by using the VR lens adjustment equipment（J15380）to maintain the functional accuracy of the picture blur correction.
However, except for disassembling the above part, the VR adjustment is NOT necessary.

At service agencies where the "VR lens adjustment equipment" is not prepared, do NOT disassemble NOR repair the products of the above case.

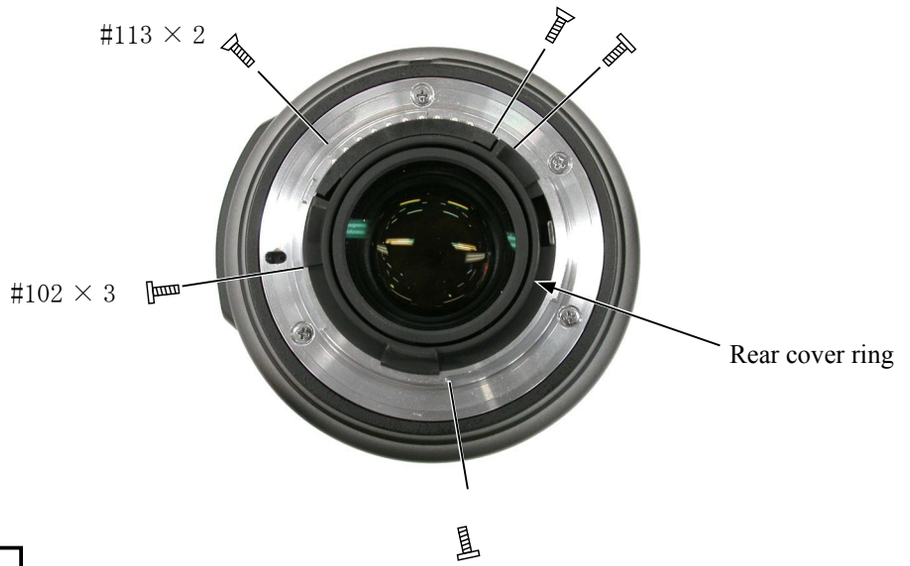
DISASSEMBLY

1ST LENS GROUP

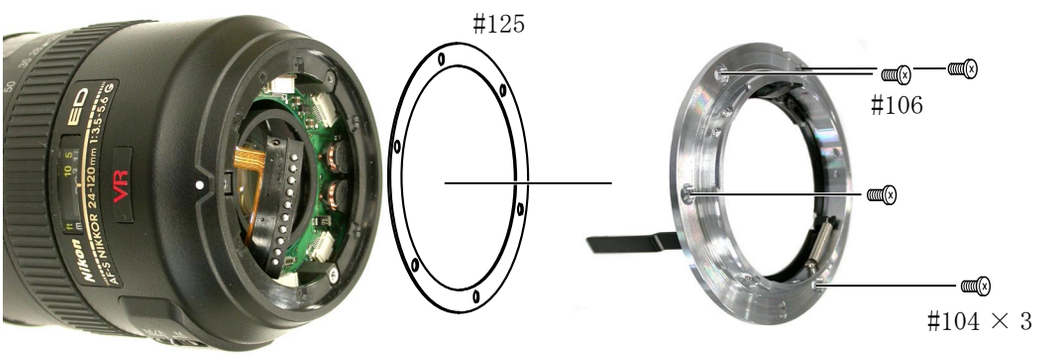




REAR COVER RING

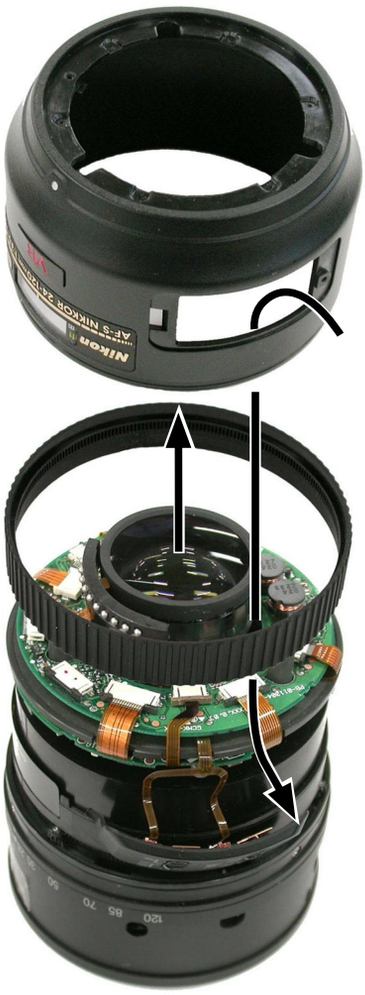


BAYONET



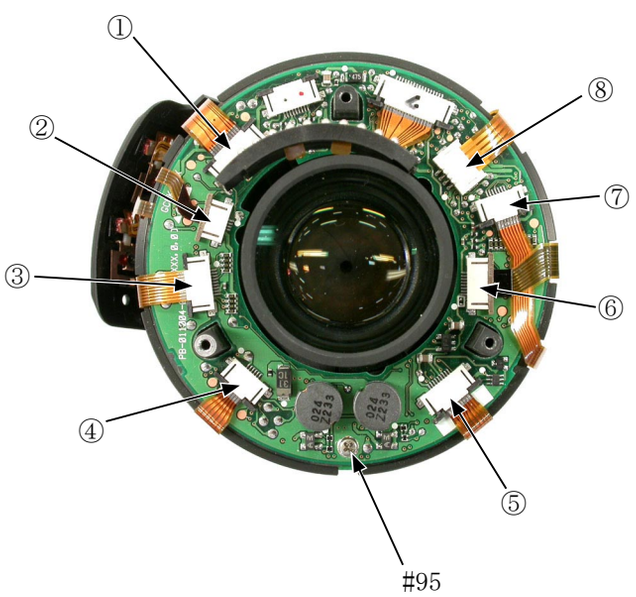
INDEX RING, FOCUS RING

・Unscrew #122, and lift the M/A change-over SW in the direction indicated by the arrow.



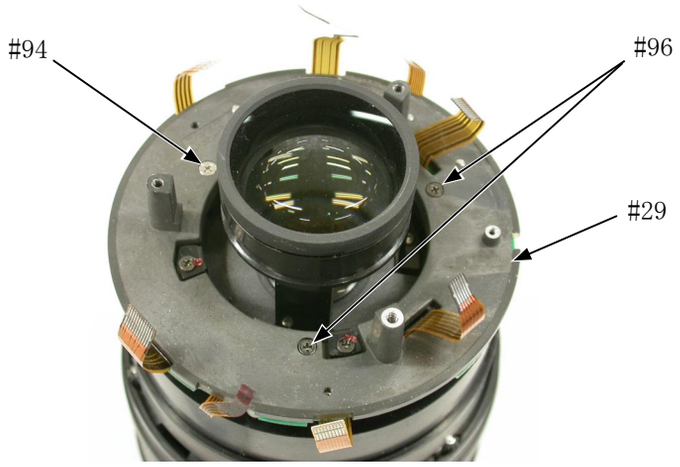
・By passing the M/A change-over SW through the hole of the index ring, detach the index ring and focus ring.

MAIN PCB

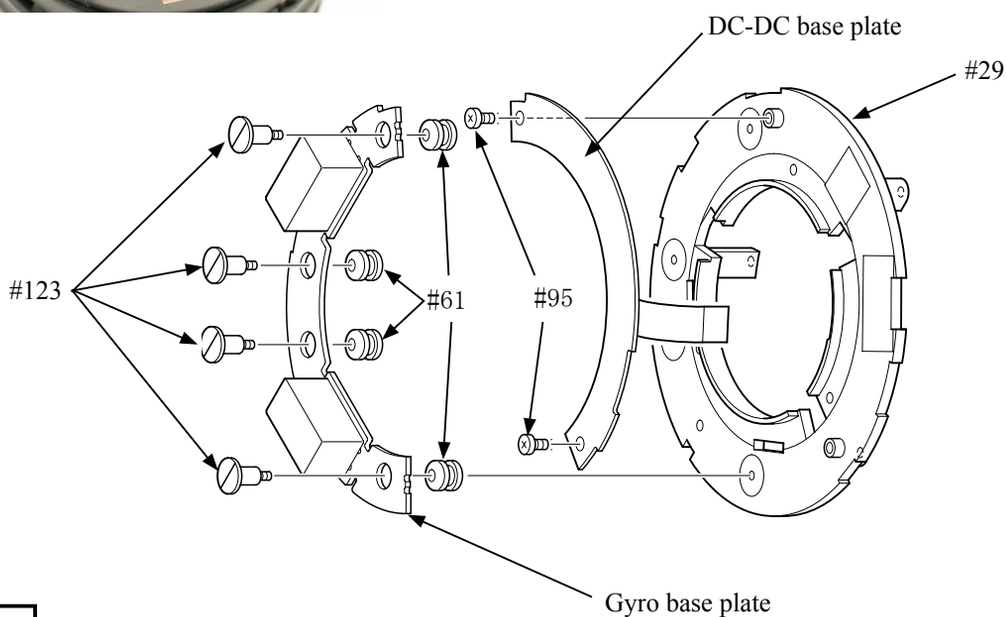


・ Remove the connector (at 8 parts) and the screw (#95), and detach the main PCB.

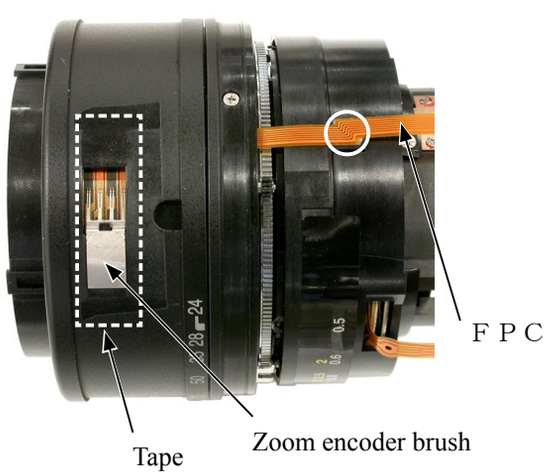
GYRO BASE PLATE / DC-DC BASE PLATE

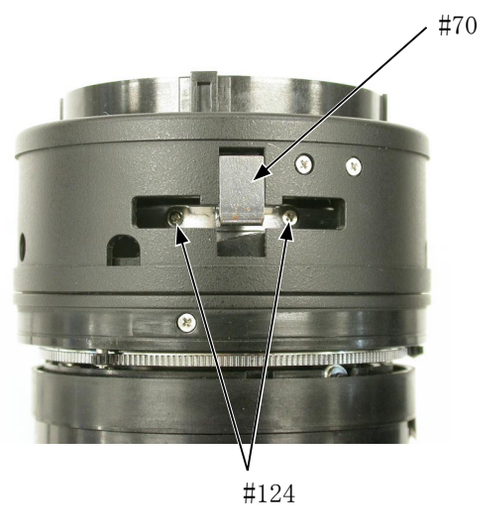


・ Take out 2 screws (#96) and 1 screw (#94), and lift up #29.

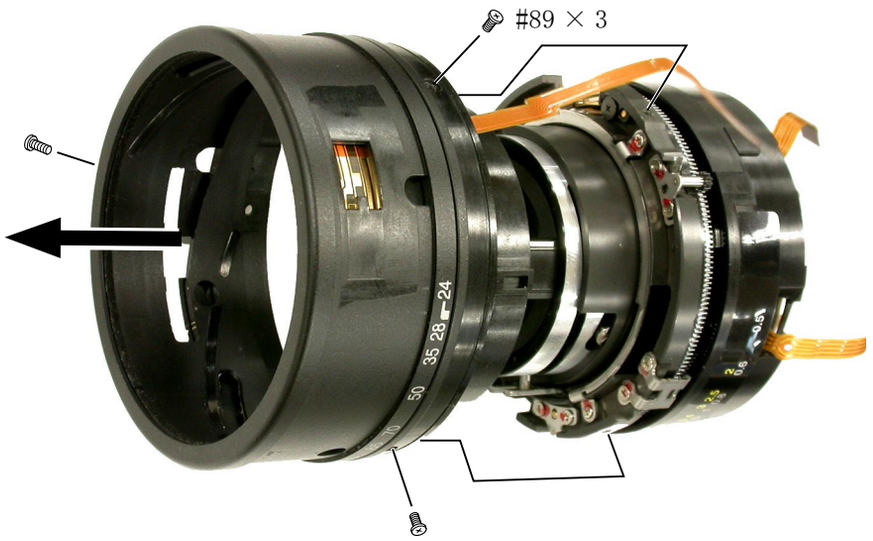


ZOOM RING

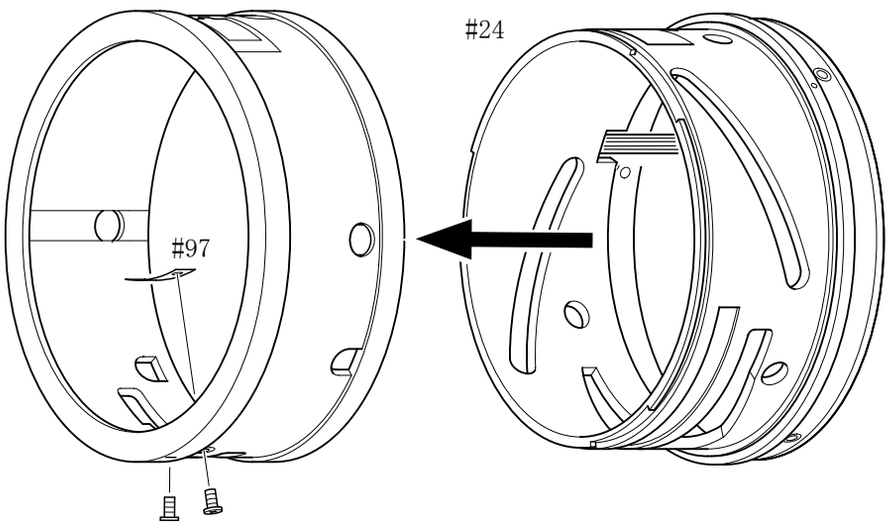




・ Remove the tape and detach the zoom encoder brush by displacing it.
・ Remove the circled part of the FPC.
・ Turn the zoom to the TELE side, and take out 2 screws (#124) and #70.



Zoom ring



DISTANCE SCALE RING

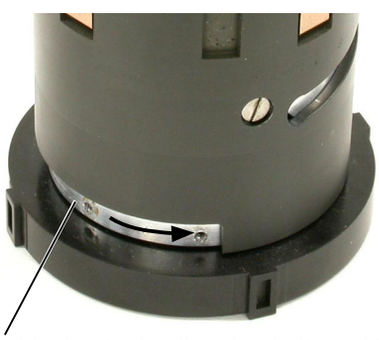
SWM UNIT

4TH LENS GROUP FRAME

Caution :

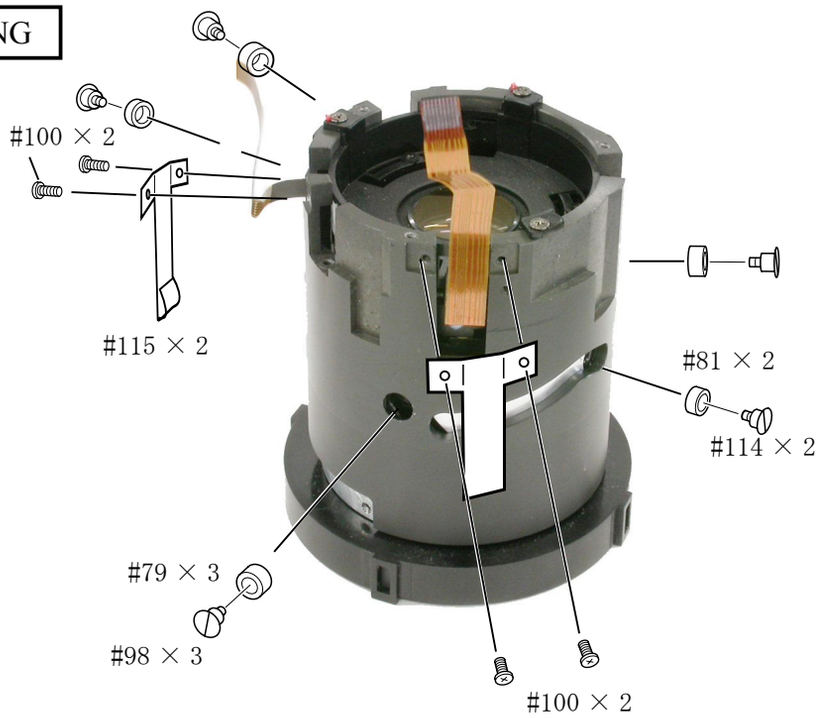
In case of removing the 4th lens group, the lens alignment is required.

At service agencies where the operations of the alignment cannot be performed, do NOT detach the 4th lens group.



Turn this ring in the direction indicated by the arrow, and set the zoom to WIDE.

CAM RING



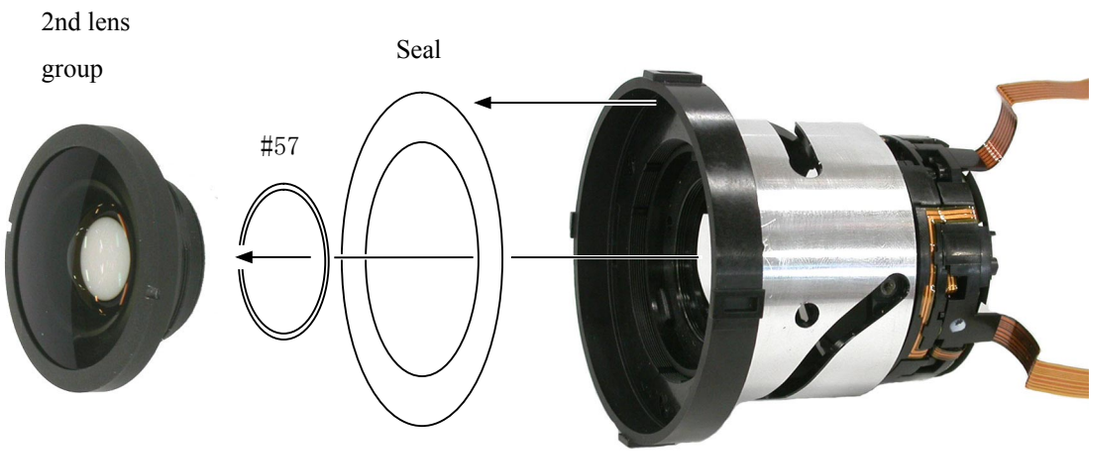
△(Addition)

Caution:

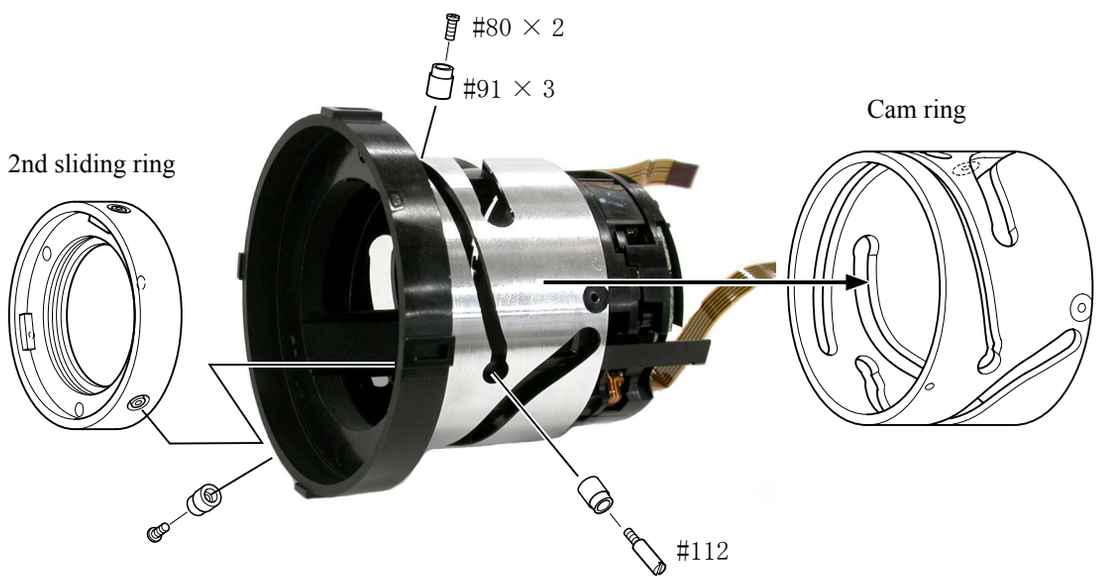
Removing G11, G12 lens-housing unit may cause a failure of optical performance. In this case, inform the Kyotens of each region.

サービス計画課 M

2ND LENS GROUP

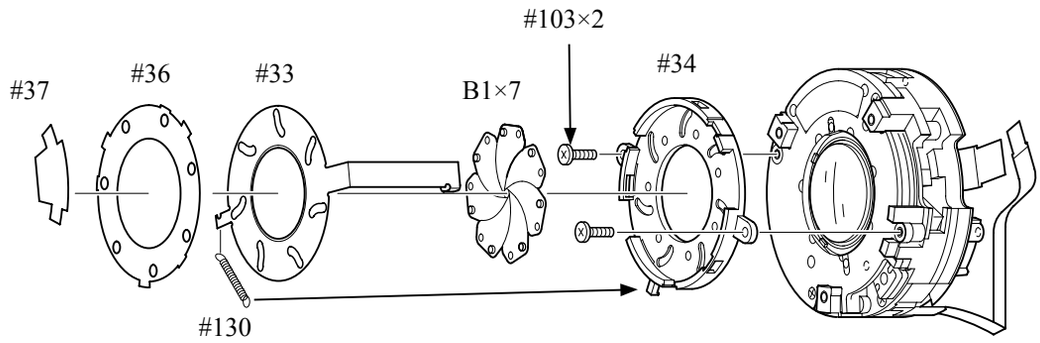


2ND SLIDING RING, CAM RING



VR UNIT

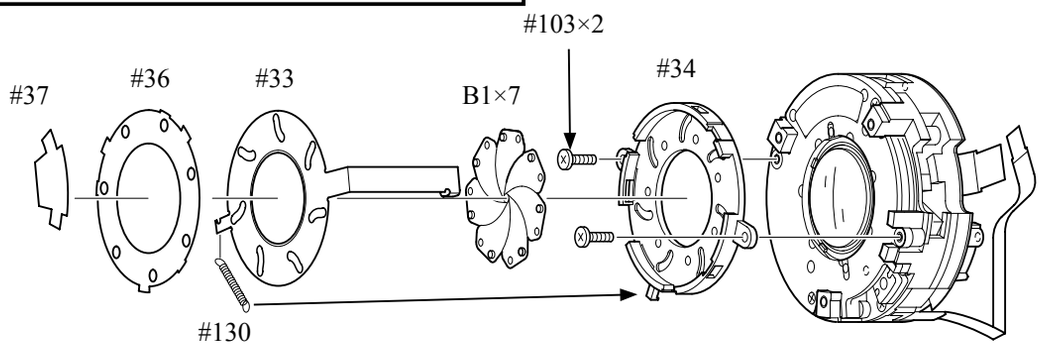
APERTURE BLADE HOUSING GROUP



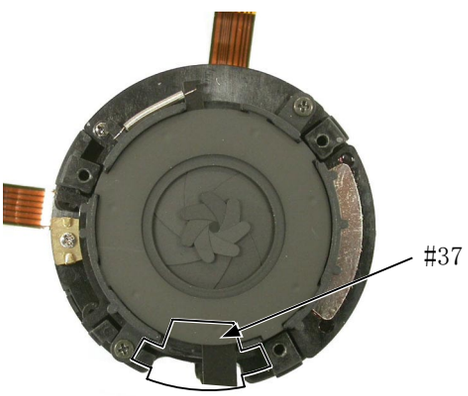
VR unit

ASSEMBLY

APERTURE BLADE HOUSING GROUP

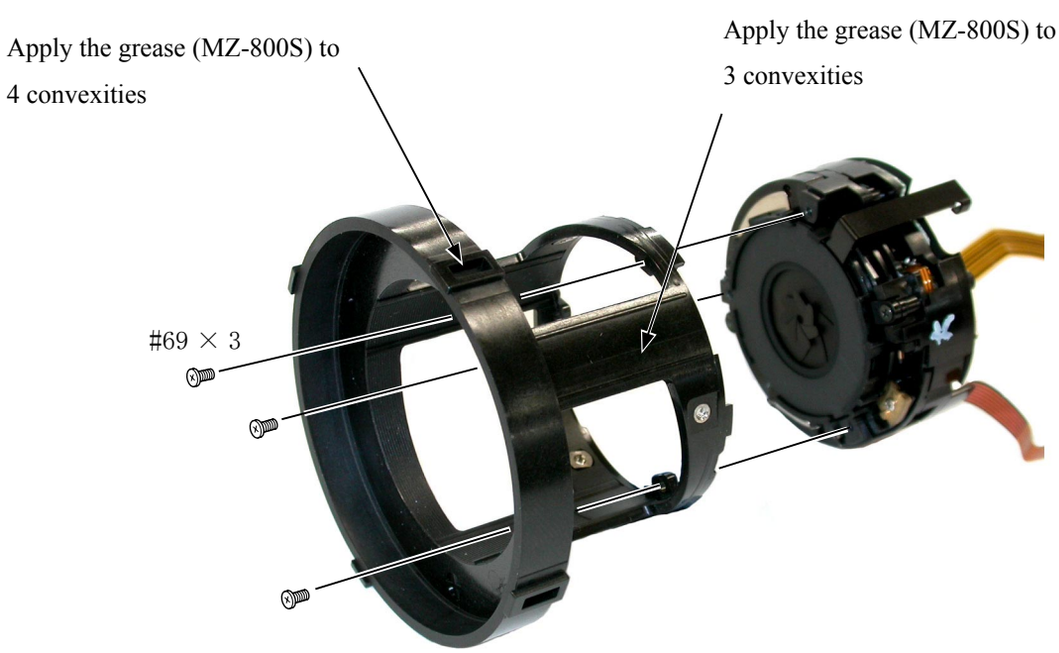


VR unit

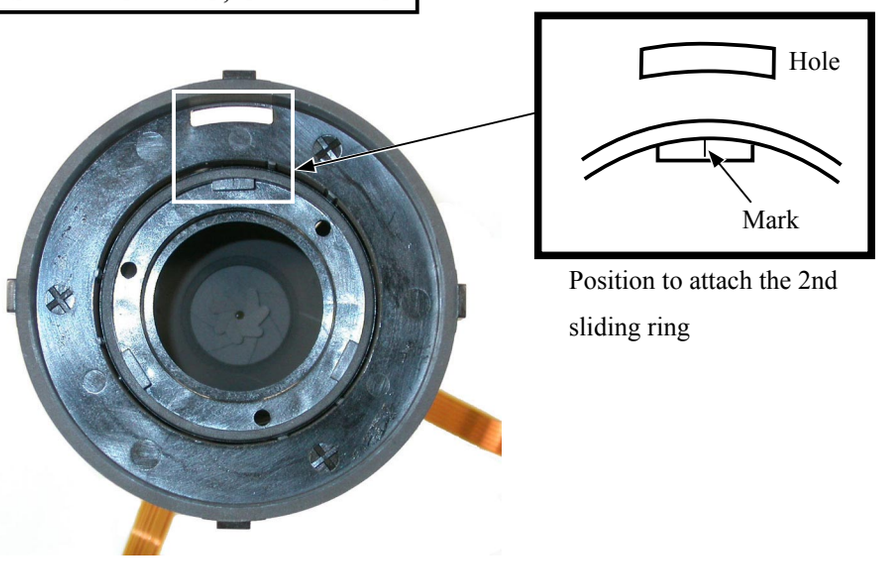


Position to attach #37

VR UNIT

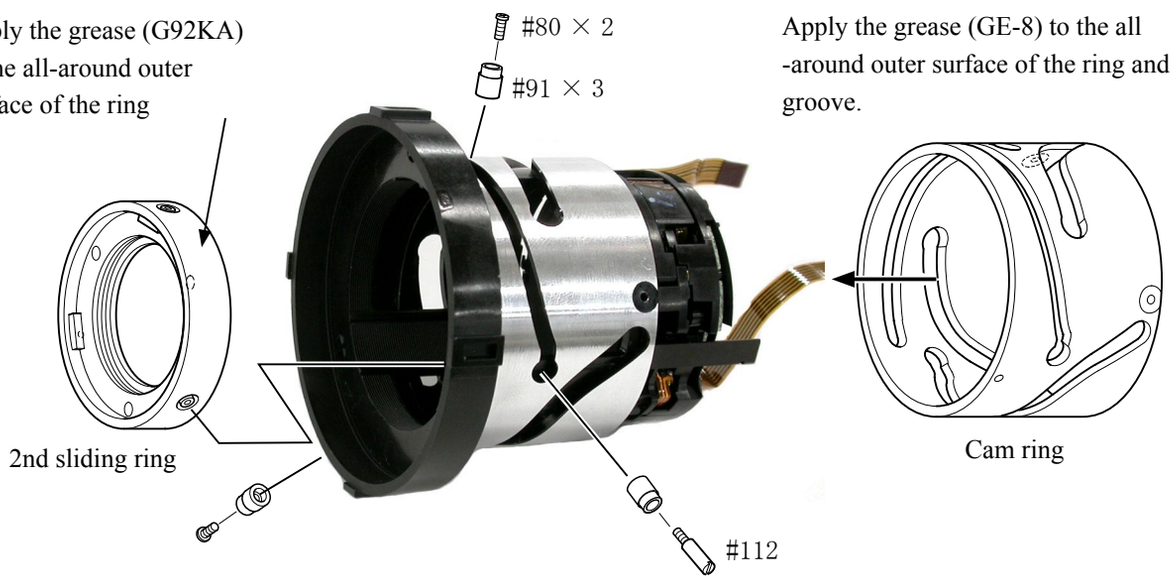


2ND SLIDING RING, CAM RING



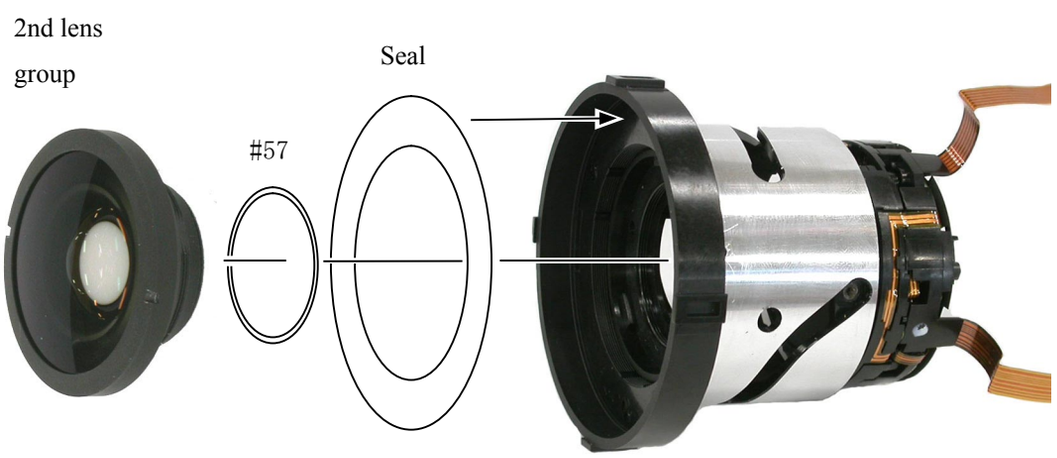
Position to attach the 2nd sliding ring

Apply the grease (G92KA) to the all-around outer surface of the ring



Apply the grease (GE-8) to the all -around outer surface of the ring and cam groove.

2ND LENS GROUP



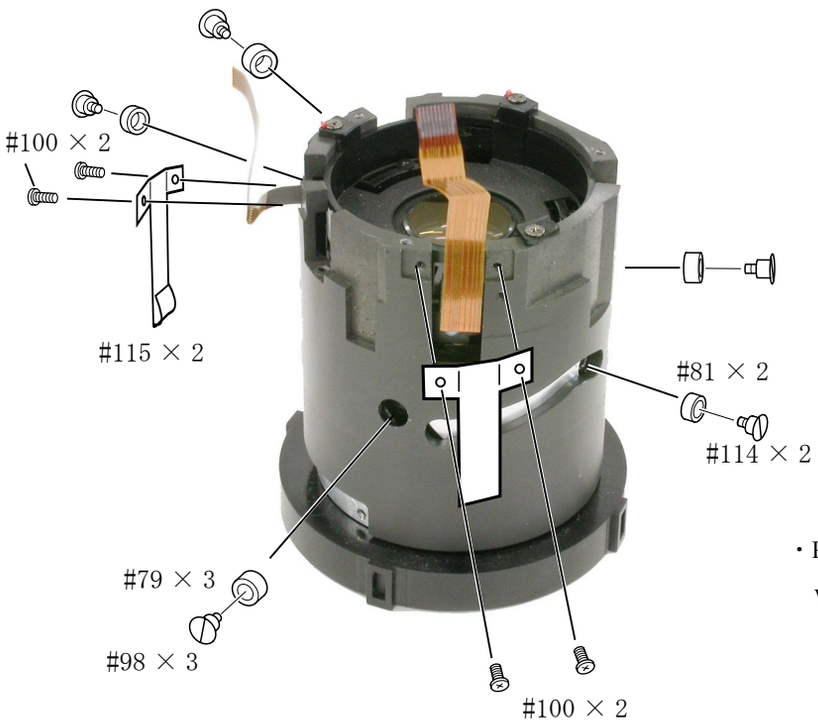
CAM RING

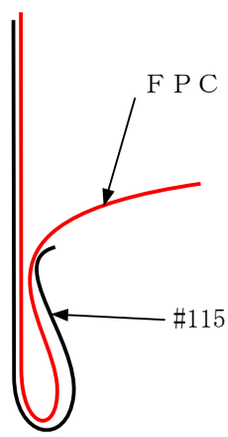
Apply the grease (GE-8) to 5 convexities

Attach : Screw Lock

#96 × 3

3rd lens group

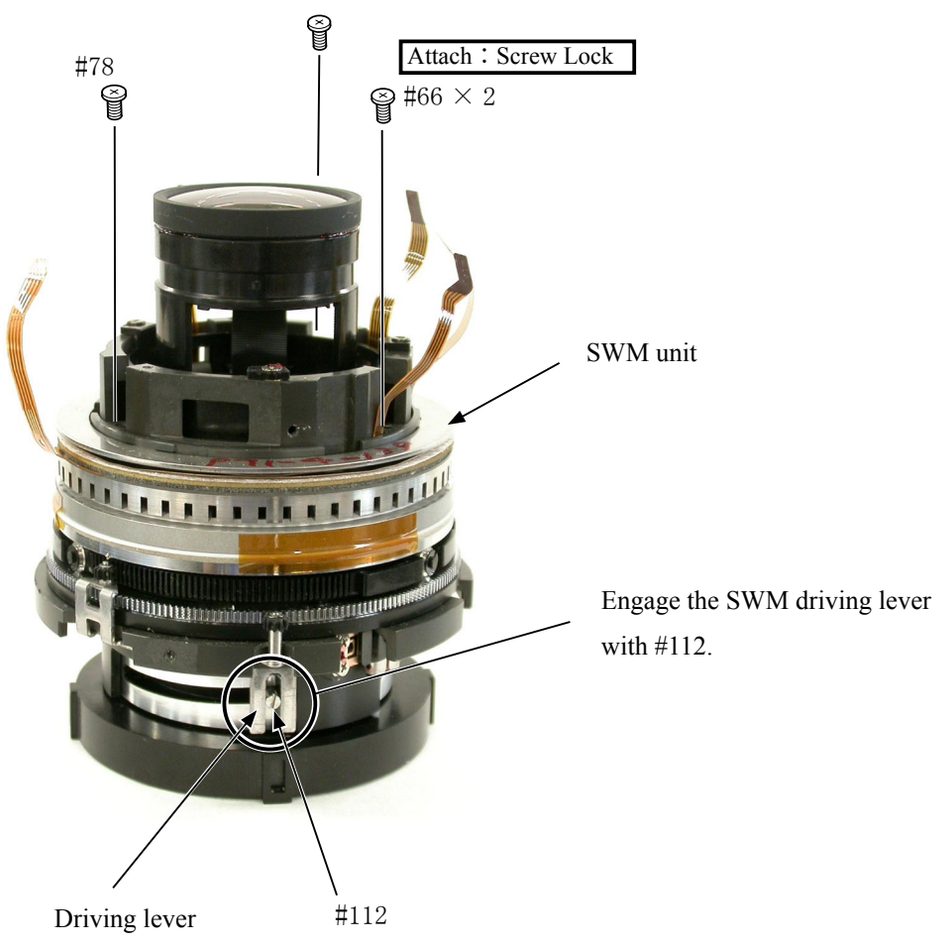




・Pinch the FPC by #115, and attach #115 with the screw (#100).

4TH LENS GROUP FRAME

SWM UNIT



INSPECTION AND ADJUSTMENT OF THE MR ENCODER OUTPUT WAVEFORM

・As a preparation for adjustment, assemble temporarily #24 and the focus ring. Do NOT attach the screw (#89).

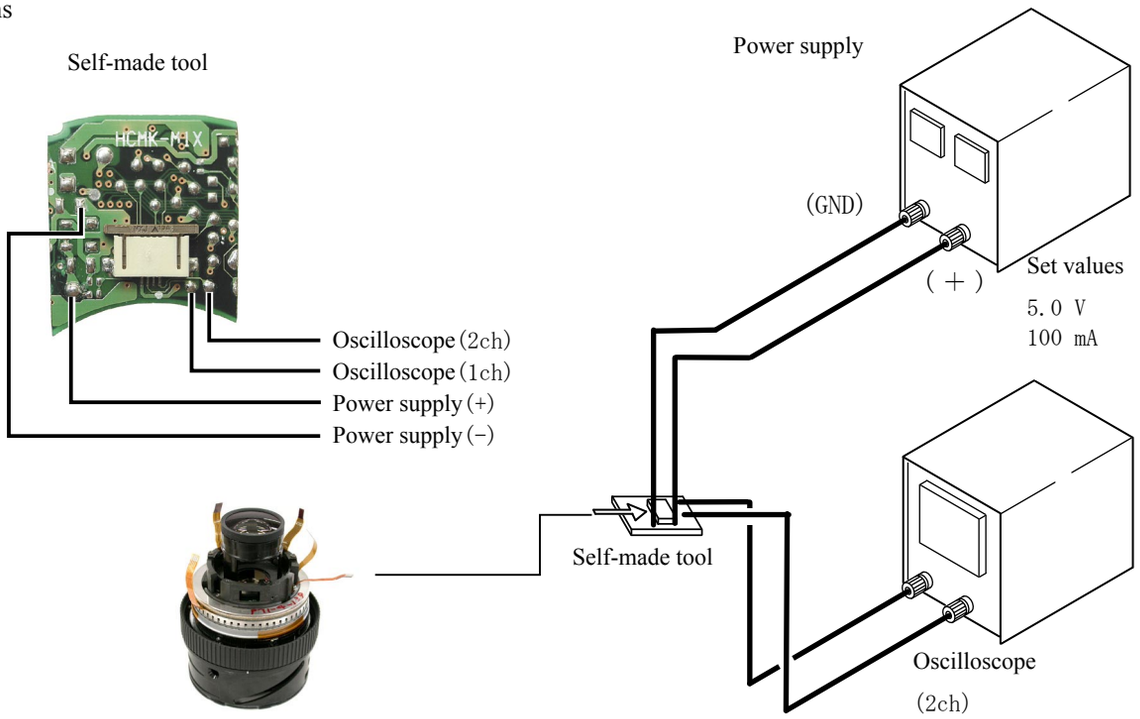
●In case of disassembling or replacing the MR head, be sure to make adjustments.

1. Equipment and tools to be required
   - ・Single output rated voltage power supply: 1 unit For self-made tool: 5.0V and 100mA
   - ・Oscilloscope: 1 unit
   - ・Self-made tool: 1 unit Use the tool that was made for AF-S24-85/3.5-4.5G

   Caution : In case of any trouble in continuity between the self-made tool and the contacts of relay FPC, there may be dust, corrosion or oxidation on the contact surface of relay FPC. Be sure to polish the contact surface before connecting to the self-made tool.

2. Preparation for the measuring lens
   - ・Assemble the SWM unit mounted with the MR head, the focus ring, and #24 into the body , then connect to the measuring devices. (Ref. next page.)

・Connections



・How to inspect and adjust

① Make sure that the electric current and voltage of the connected rated voltage power supply are set to the set values, and turn the power ON.

② Set the oscilloscope and rotate the focus ring by hand.

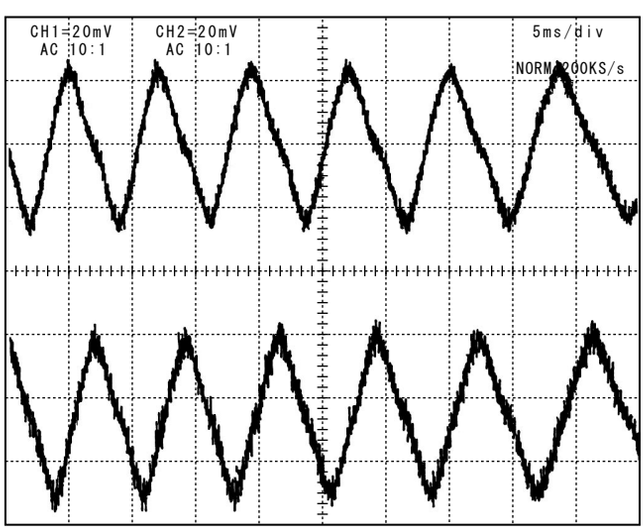
Note：Because the waveform varies depending on the rotational speed of the focus ring, change the setting of Time/Div properly.

③ In case wide waveform noise is seen, use the filter function.

How to set the filter function in case of Yokogawa-manufactured DL1540

1． Press the filter button.

2． Turn "Smooth" ON in the menu on the PC screen.



● Oscilloscope setting

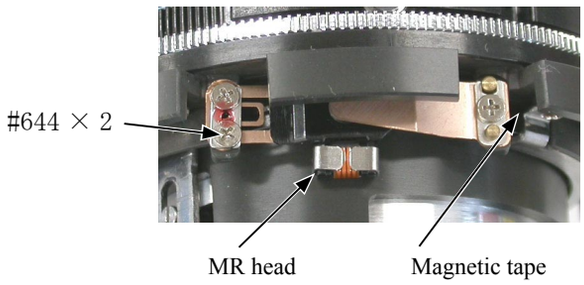
V/Div (ch1)	：２０ｍＶ
V/Div (ch2)	：２０ｍＶ
Coupling	：ＡＣ
Time/Div	：５ｍ Sec
Trigger Mode	：ＮＯＲＭＡＬ
Trigger Coupling	：ＡＣ
Trigger Source	：ＣＨ１
Trigger Position	：＋４div
Trigger Type	：ＥＤＧＥ
Trigger Level	：０Ｖ
INPUT (ch1)	：ＡＣ
INPUT (ch2)	：ＡＣ

Standard：50mV or more of the amplitude of all waveforms

Note：Check the waveform by moving the focus ring back and forth from the infinity-end position to the close distance end position.

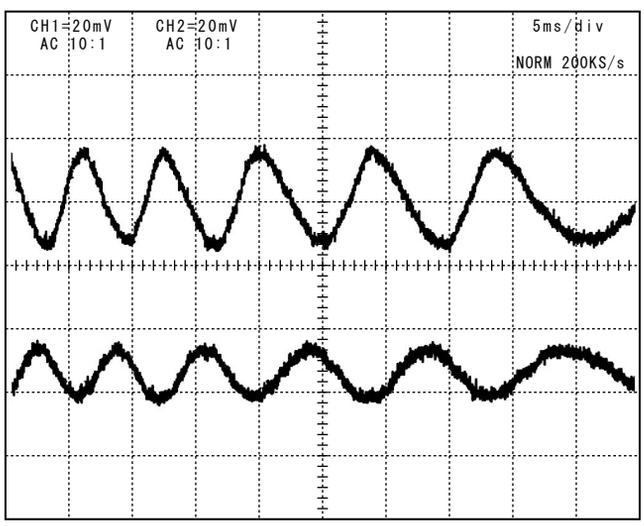
④ In case of small amplitude, lift the focus ring and #24.
Then loosen two screws (#644) to move and adjust the MR head position

Note : To prevent any damages to magnetic data, do NOT let the magnetic tape and MR head touch the magnetized driver bit when adjusting.

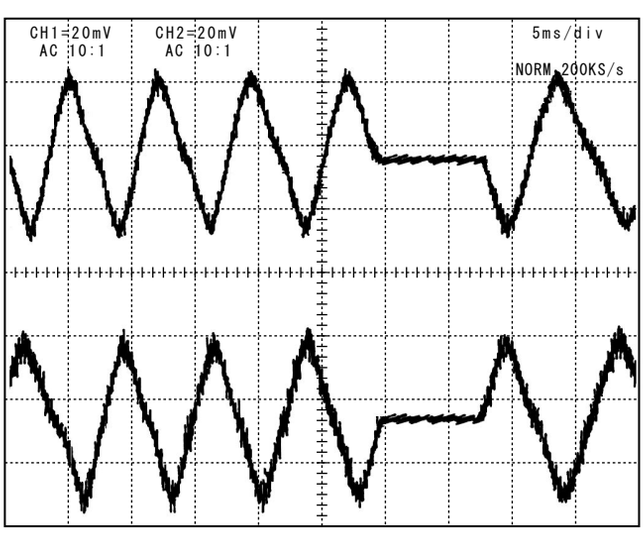


《Ref.》

● In case the amplitude of either CH1 or CH2 is smaller, check the screws (#644) because one of them may be loosened. If the screw is not loose, replace the MR head unit (B635) and readjust it because the MR head may have troubles.



● In case a drop in the amplitude between the infinity and the close distance positions is seen, replace the magnetic tape and readjust it because the magnetic data of the tape may be damaged.

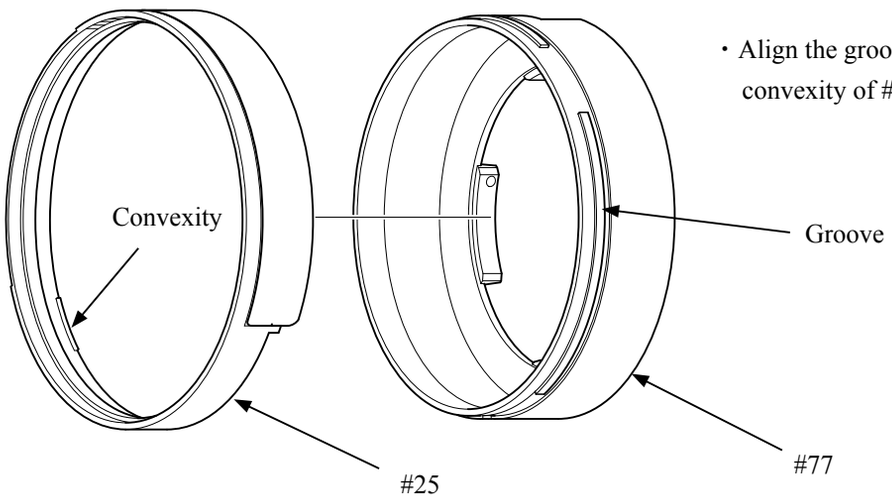


⑤ Turn the rated voltage power OFF.

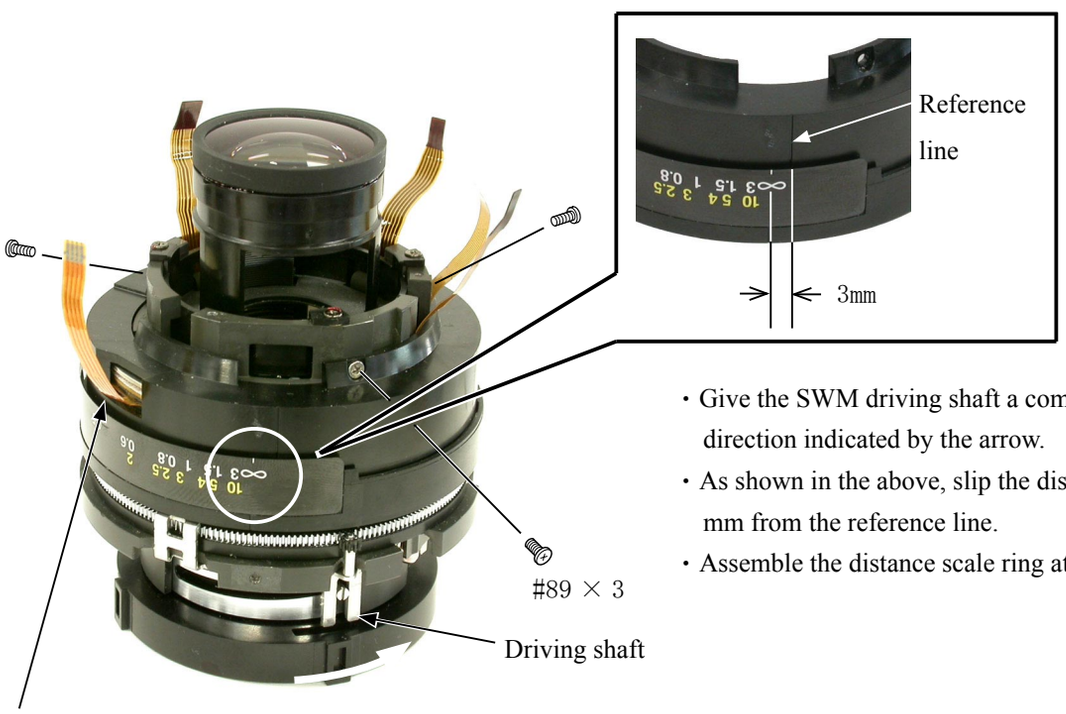
DISTANCE SCALE RING

Apply the grease (MZ-800S) to the convexity.

Pull the scale plate to align with this line, and attach it to #25.



・Align the groove of #77 with the convexity of #25 to assemble.



・Give the SWM driving shaft a complete turn in the direction indicated by the arrow.
・As shown in the above, slip the distance scale ring 3 mm from the reference line.
・Assemble the distance scale ring at the left position.

ZOOM RING

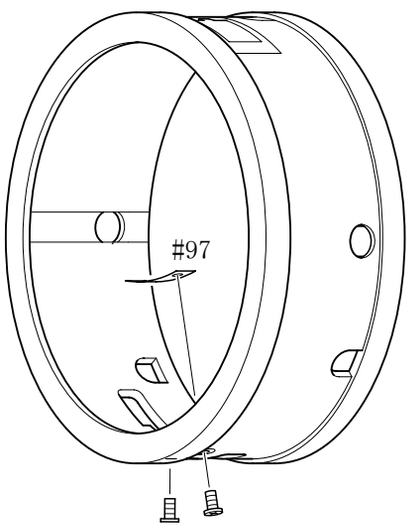
・ Pull to align the FPC in the direction indicated by the arrow and attach it.

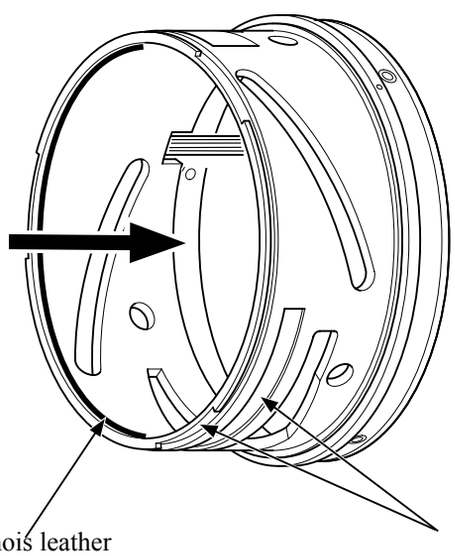
Apply the grease (MZ-800S) to 2 convexities and 2 cam grooves

Convexity

Zoom ring

#24





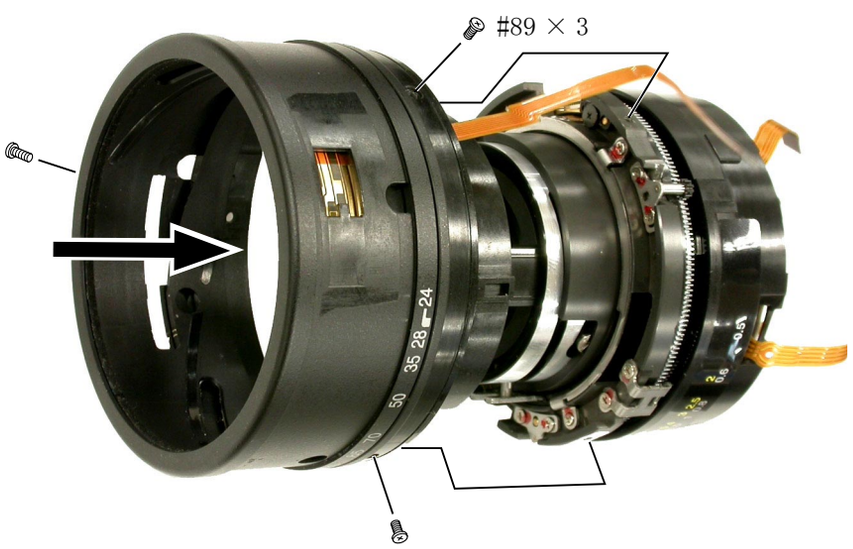
・ Attach the fine chamois leather to #24 and apply the oil barrier to the all-around attached part.
・ Align the convexity of the zoom ring and the groove of #24 to assemble.

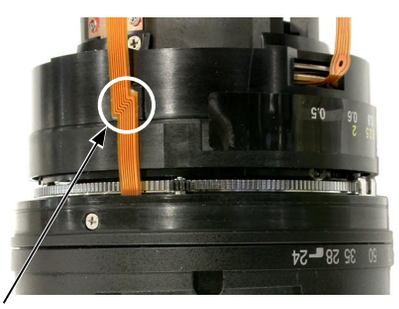
#139×2

Fine chamois leather

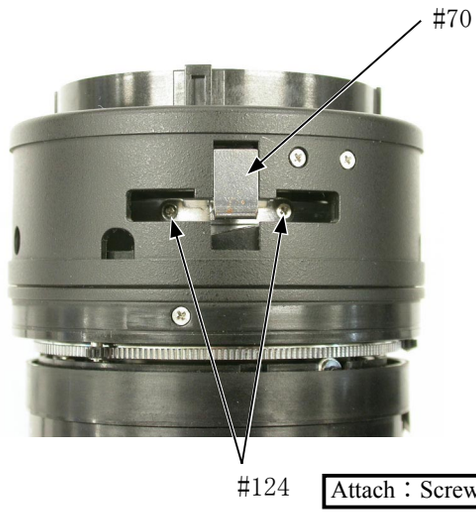
Apply the oil barrier to the all-around outer surface.

Apply the grease (MZ-800S) to the grooves.



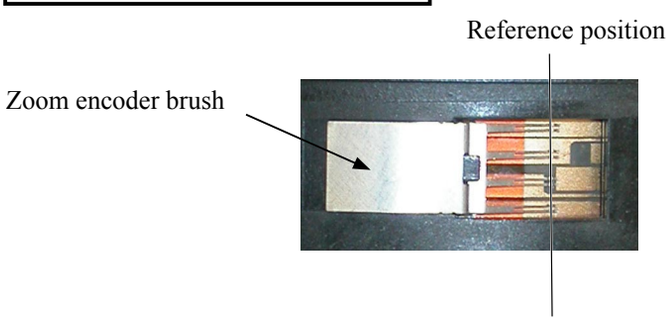


Attach with the both-sided adhesive tape.



・ Set the zoom to the TELE side, and attach and fix #70 with 2 screws（#124).

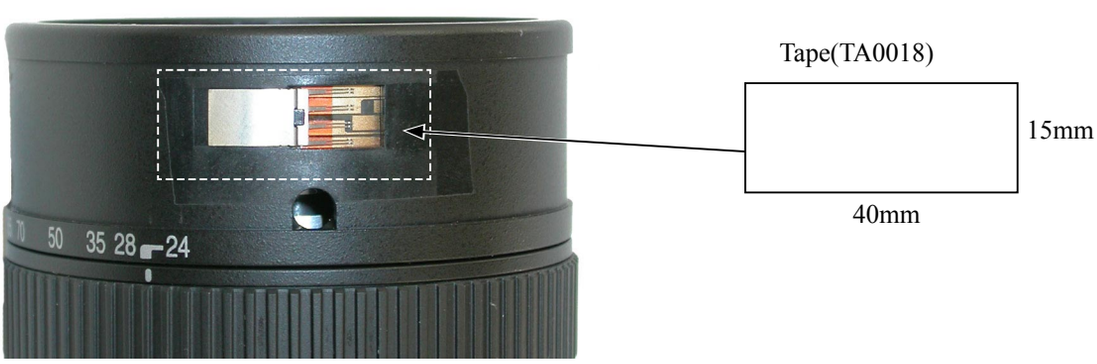
ZOOM ENCODER BRUSH



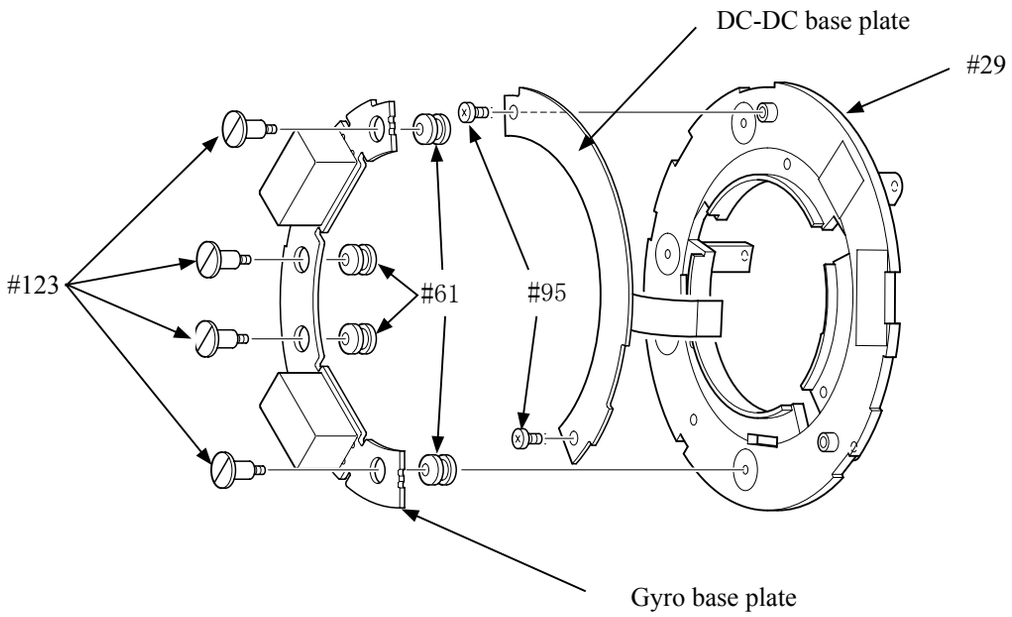
・ Set the zoom to WIDE side.

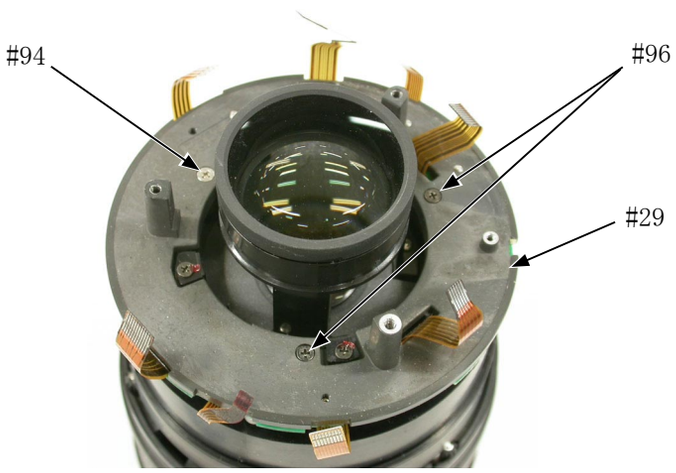
・Attach the zoom encoder brush at the reference position of the left.

・ Cut the tape （TA0018) into 15mm×40mm piece, and attach it at the left position.



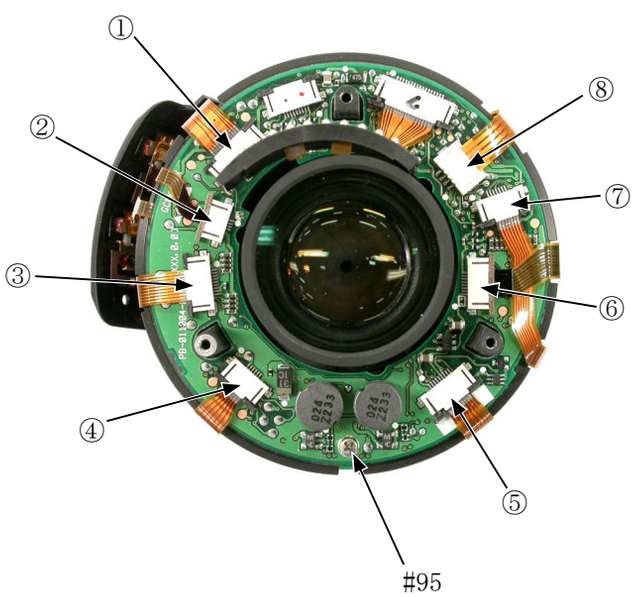
GYRO BASE PLATE / DC-DC BASE PLATE





- Attach the gyro base plate and DC-DC base plate to #29, and mount them on the body with 2 screws (#96) and 1 screw (#94).

MAIN PCB

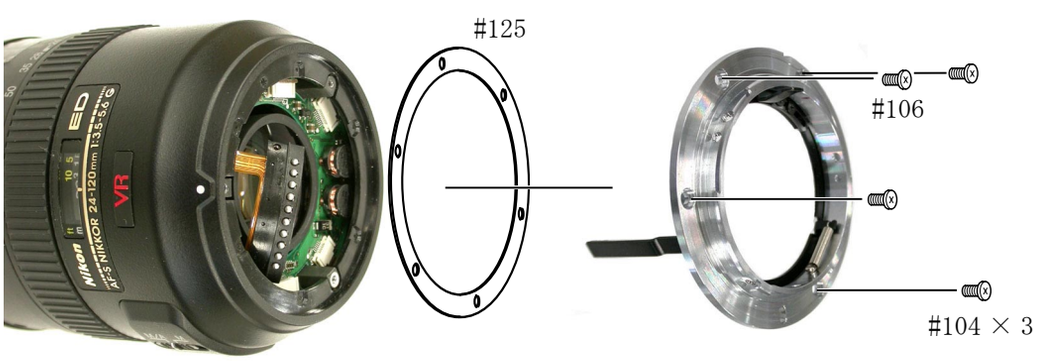


- Put the M/A change-over SW into the connector ② .
- Insert the connectors (at 7 parts) and attach the main PCB with the screw (#95).

INDEX RING, FOCUS RING

- Attach the focus ring.
- Pass the M/A change-over SW through the hole of the index ring and attach the index ring.

BAYONET

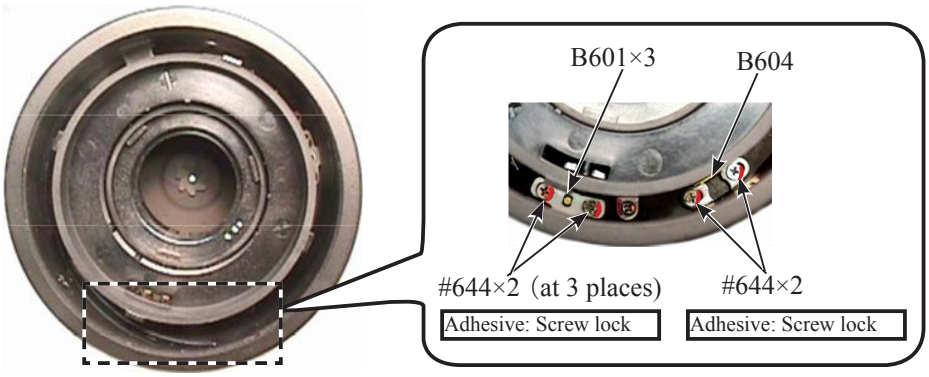


INSPECTION & ADJUSTMENT OF FOCUS RING OPERATIONS

・Check the operations of the focus ring.

If the focus ring does not move coupled with the focus index (scale), which can be seen through the index window, make the adjustment by following the below procedure.

・Loosen the two screws (#644) for [B601] at three places [six screws (#644) in total] and also loosen the two screws (#644) for [B604].



・Stand the lens vertically. Hold the focus ring so as to position [B601] inwards, then tighten two screws (#644). Then in the same way for the rest, tighten the four screws (#644) for the two of [B601].

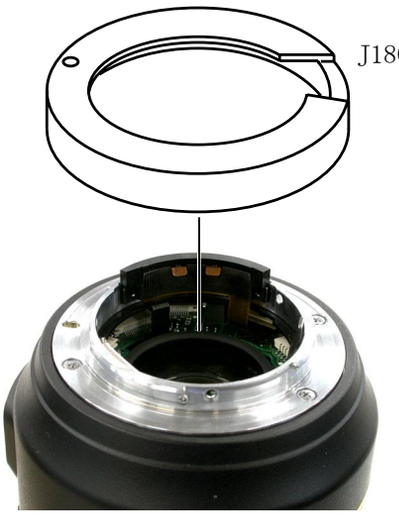
△ (Reivision)

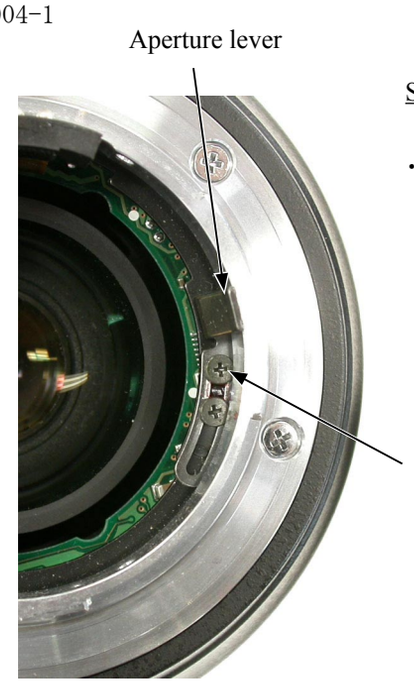
・Tighten the two screws (~~#664~~ #644) for [B604].

・Check the operations of the focus ring again.

サービス計画課 M

POSITION ADJUSTMENT OF APERTURE LEVER



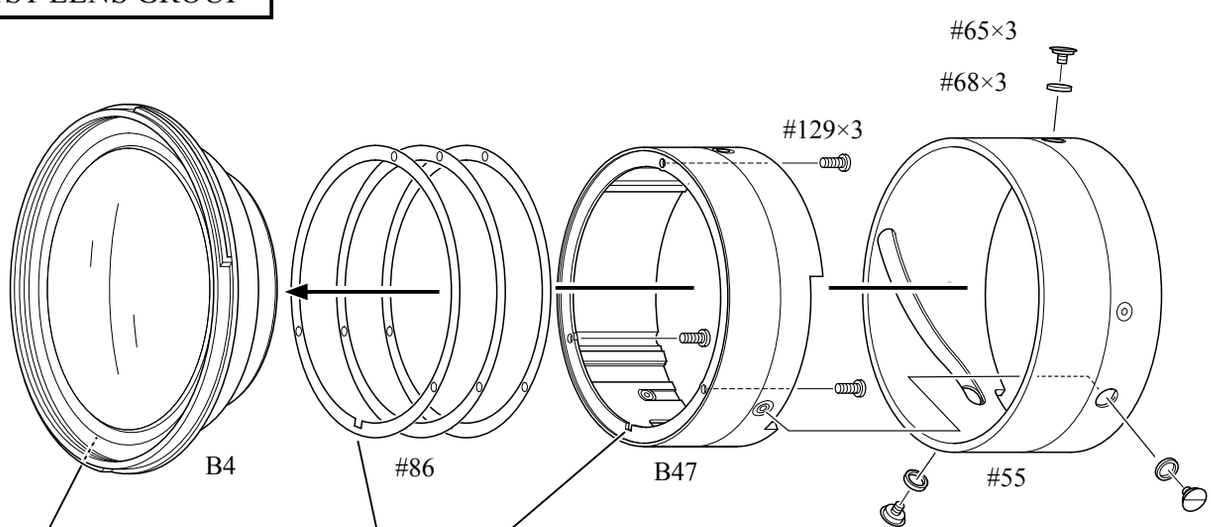


・ Attach the tool (J18004-1) and check for the aperture opening.

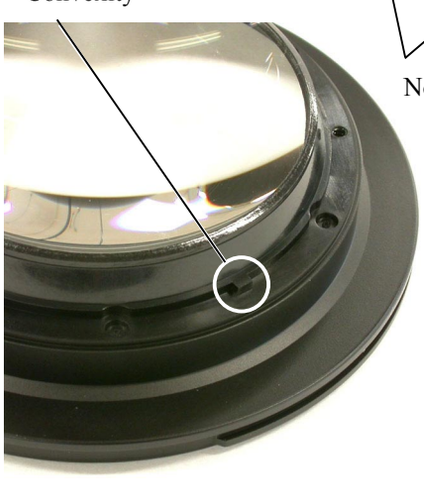
Standard : Full aperture

・ In case the standard is not met, adjust the position of aperture lever by loosening 2 screws (#92).

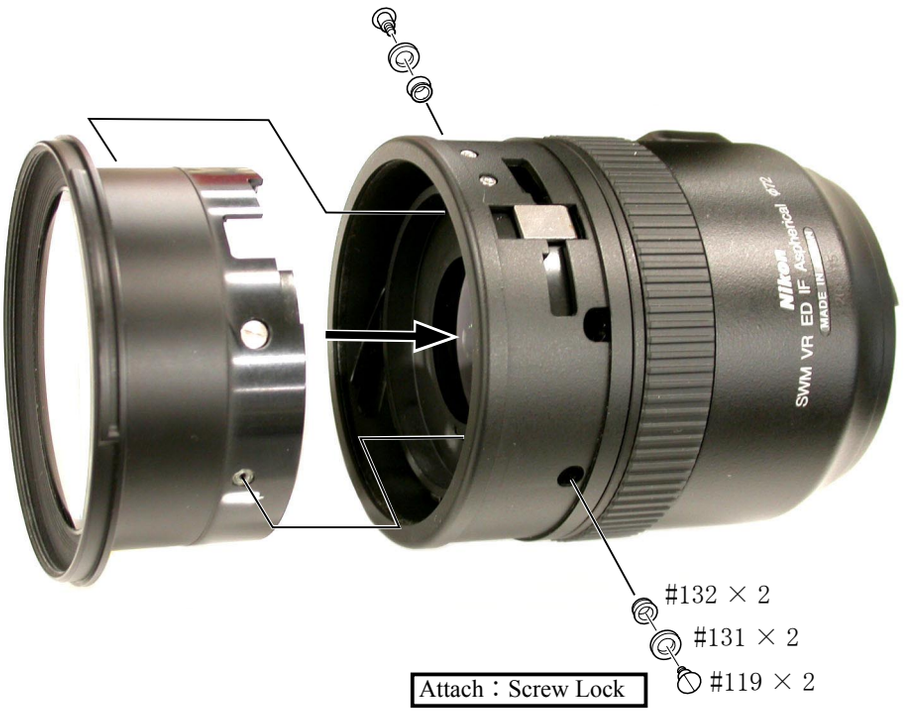
1ST LENS GROUP



Apply the grease (GE-8) to cam grooves (at 3 parts).

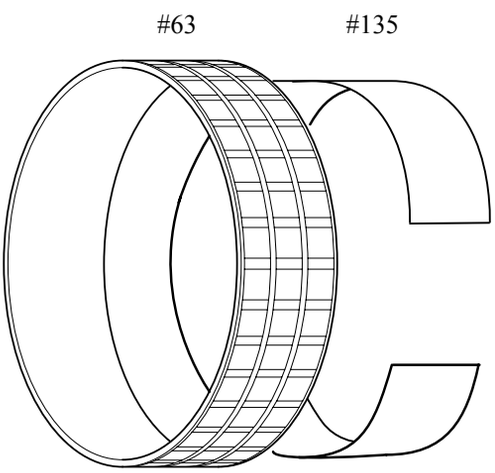


・ Fit the convexity of the 1st lens group (B4) in the notches of B47 and #86 to assemble them.



- Set the zoom to WIDE side.
- Turn #55 so that the screw (#65) can be seen.
- Assemble the 1st lens group at the above position.

RUBBER RING



Lens alignment

(Note)This adjustment is required when the 4th lens group is removed.

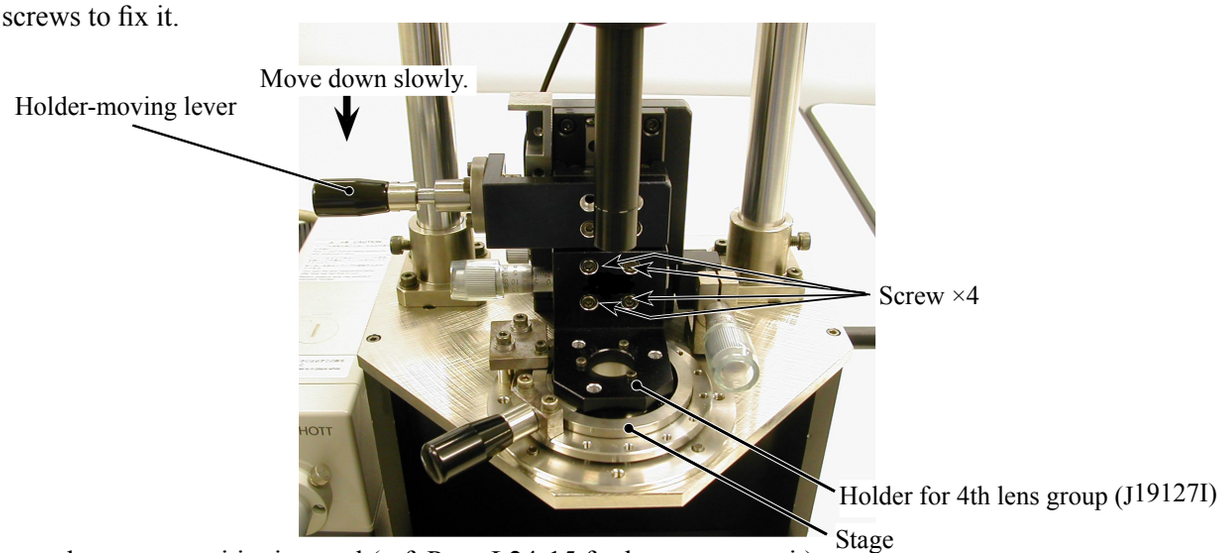
(Note) After confirming that the VR lens is locked (Vibration reduction switch is OFF), make this adjustment.

For the vibration reduction switch, refer to Page 17 of User Manual supplied with the lens.

(1) Preparation of Lens optical alignment equipment

・Fix the holder for 4th lens group (J19127I) in the lens equipment for periphery alignment.

How to fix: Move down the holder-moving lever slowly so that the holder touches the stage. Then tighten 4 screws to fix it.



・Create the center positioning tool (ref. Page L24-15 for how to create it).

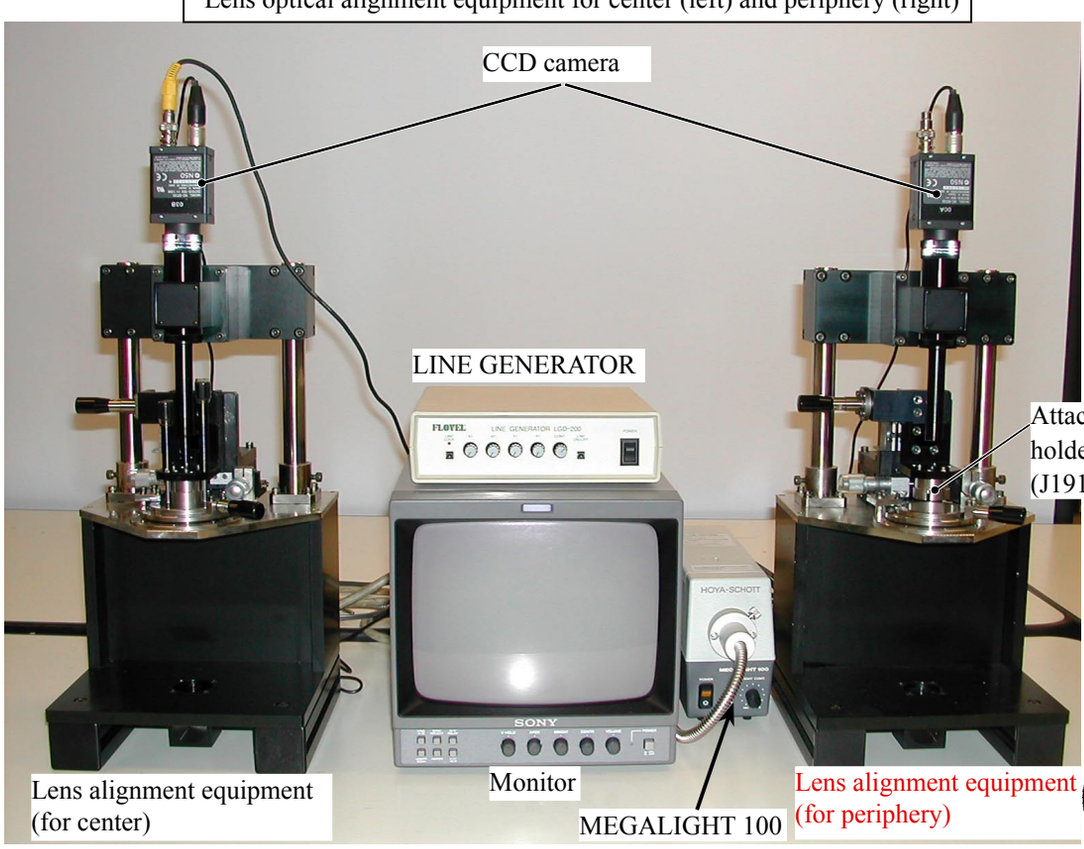
(Note) The tool (AF-SED24-85/3.5-4.5G) is used.

・Create cardboard in which "Lens alignment chart" and "Viewers" are fit.

(ref. Page L24-17 for how to create it.)

(Note) The below left equipment for center alignment is NOT used for AF-S VR24-120/3.5-5.6G.

Lens optical alignment equipment for center (left) and periphery (right)



・Connect both the cable of VIDEO terminal of the CCD camera and the fiber-optic cable of the MEGALIGHT 100 to the equipment (for periphery).

Back view of Lens optical alignment equipment for center and periphery

・ Connect each cable to the appropriate equipment with the same number. (e.g. Connect up ① to‘ ①)

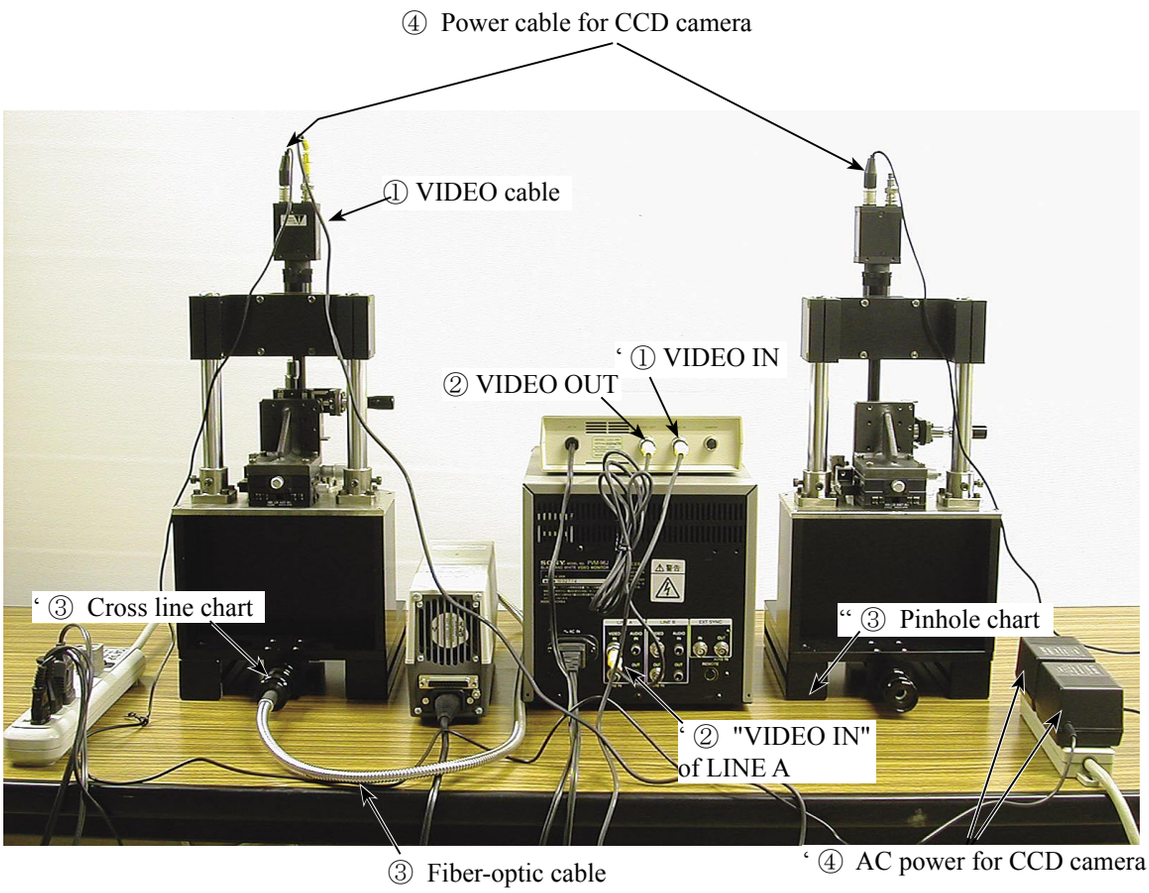
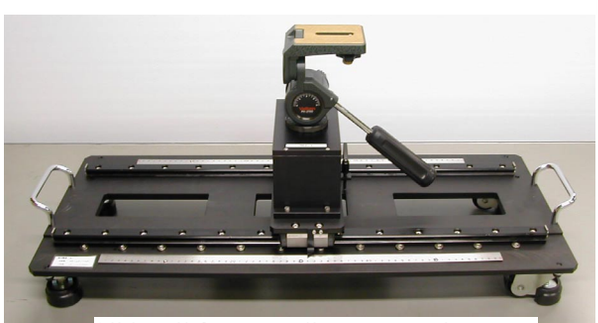
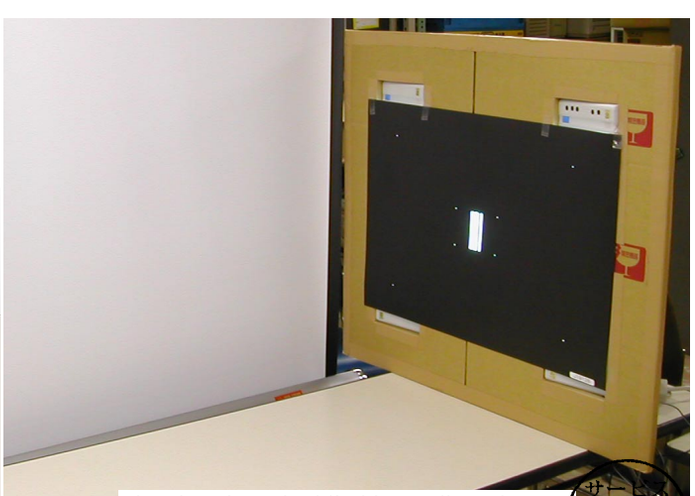

④ Power cable for CCD camera
① VIDEO cable
‘ ① VIDEO IN
② VIDEO OUT
‘ ③ Cross line chart
“ ③ Pinhole chart
‘ ② "VIDEO IN" of LINE A
③ Fiber-optic cable
‘ ④ AC power for CCD camera

Chart shooting equipment for 4th lens group alignment



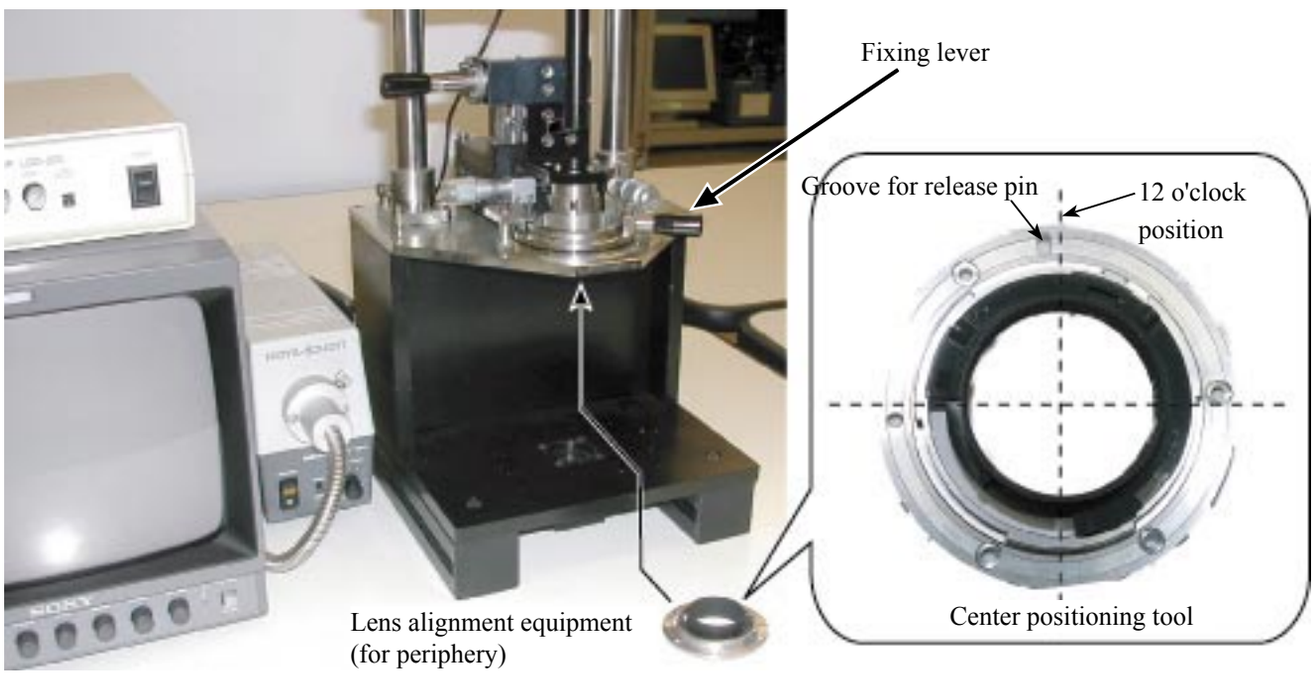
Slide rail for Lens alignment equipment



The chart is embeddied in cardboards.

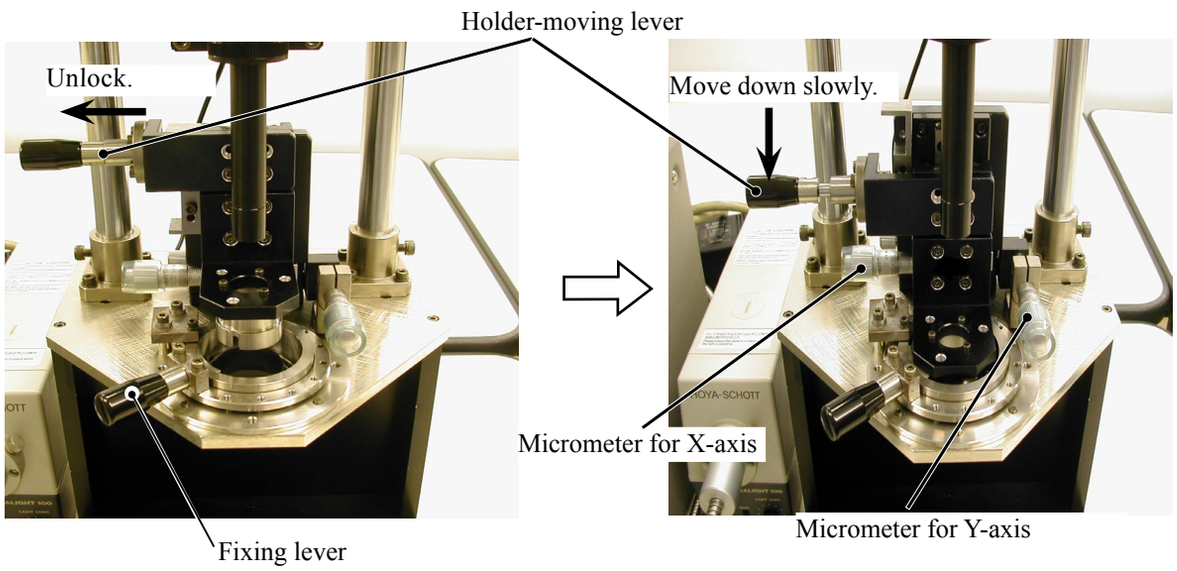
(2) 4th lens group temporary alignment

① Mount the (self-made) center positioning tool on the lens alignment equipment (for periphery) with the groove positioned slightly toward the counterclockwise direction from the below 12 o'clock position . Then turn the tool clockwise all the way to the right, and move the lever to the left to fix it.



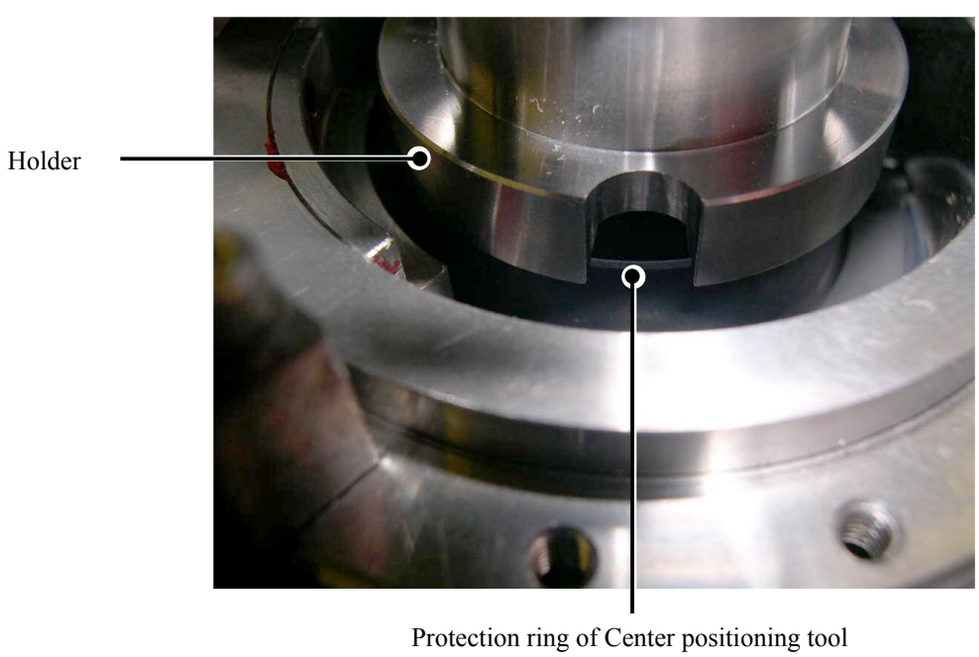
サービス計画課 M

② Unlock the holder-moving lever and move the holder down slowly by the lever.



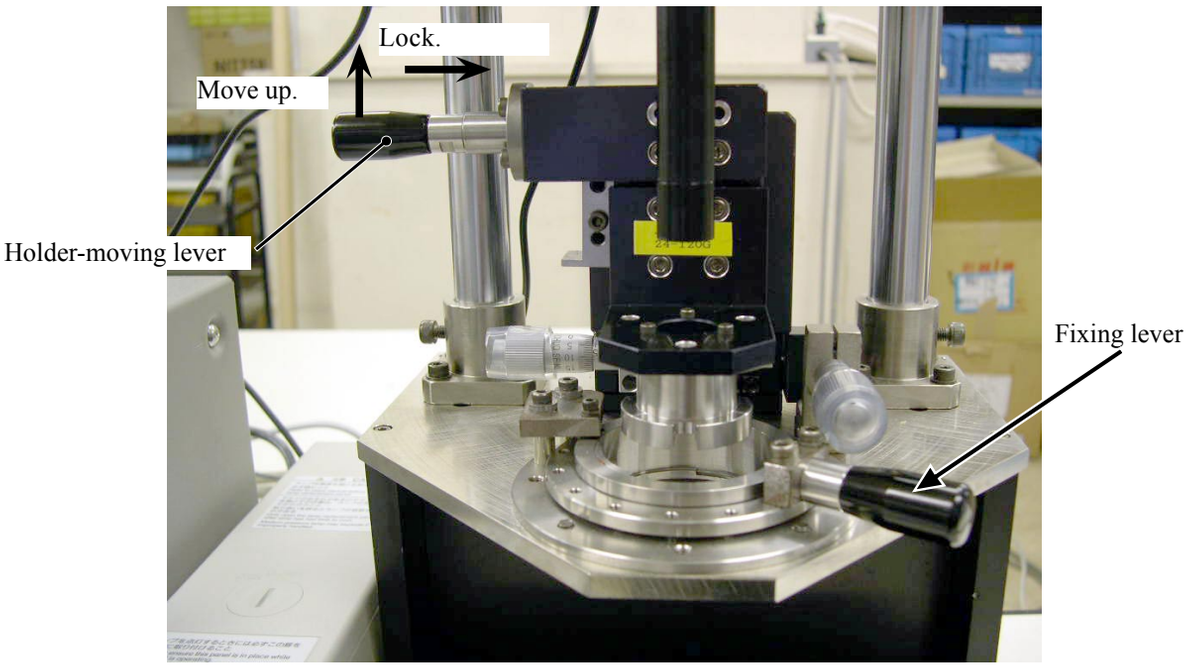
③ Adjust the holder's position by rotating the micrometers for X-axis or Y-axis so that the holder touches evenly the protection ring of the center positioning tool.

(Note) Without this alignment, the 4th lens may be damaged by the holder.



サービス計画課 M

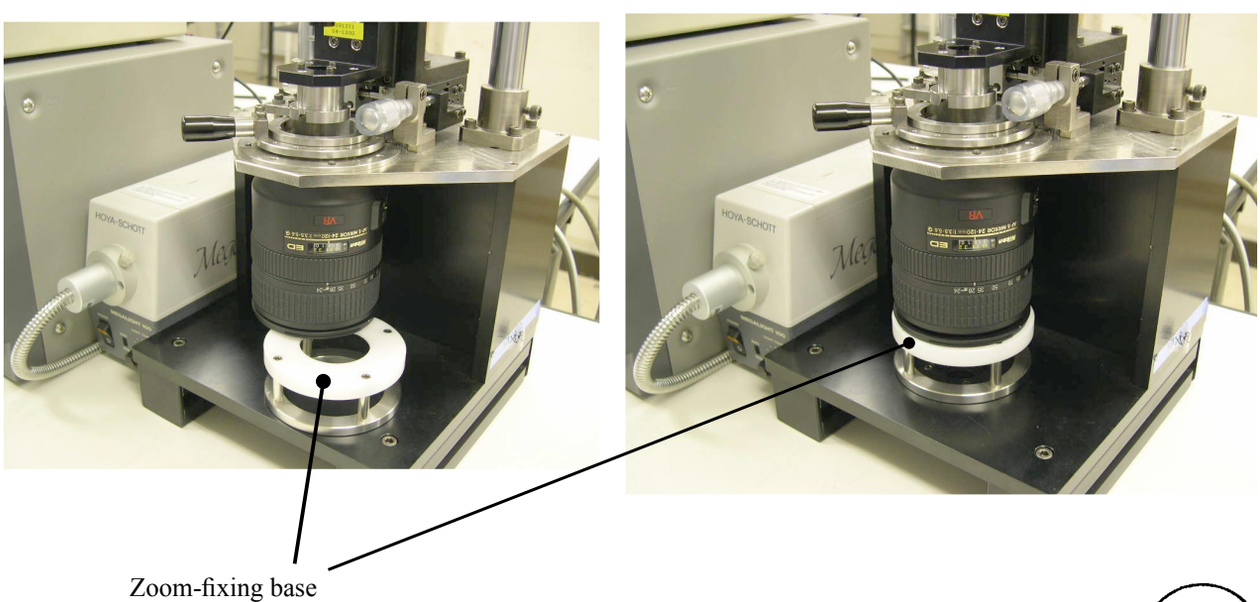
④ Move the holder-moving lever up to lock the 4th lens group holder.



⑤ Move the fixing lever of the alignment equipment to the right, and remove the center positioning tool from the equipment.

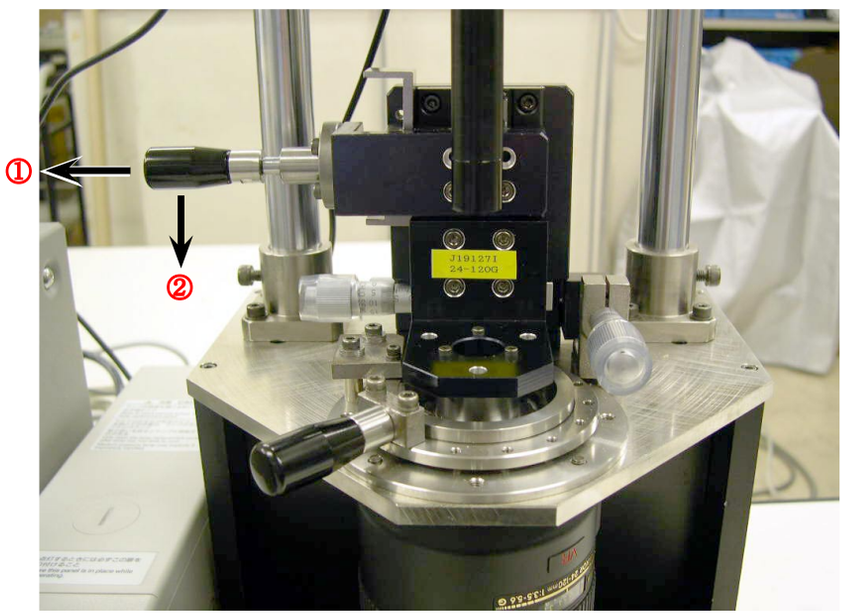
⑥ With the 3 screws of the 4th lens chamber being loose, mount the lens to be examined on the equipment (for periphery alignment). (ref. ① for how to attach it.)

⑦ Set the lens to WIDE-end. Set the zoom-fixing base under the lens (as shown below), and turn the zoom ring until the edge of the lens touches the zoom fixing base.



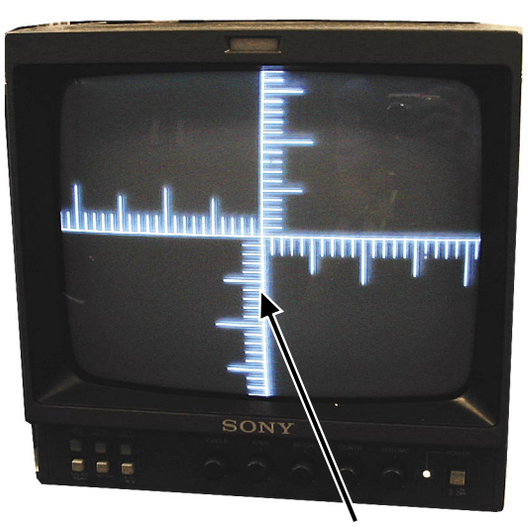
サービス計画課 M

⑧ Unlock the holder-moving lever, and move the holder down slowly by the lever.



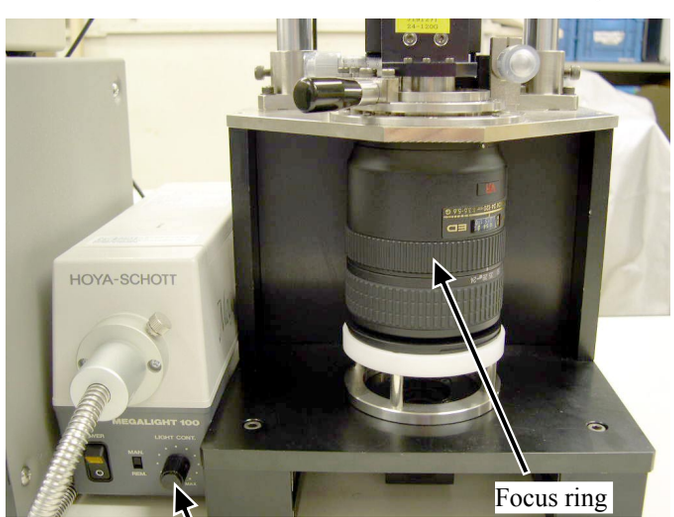
⑨ Turn the power of the monitor, LINE GENERATOR, and MEGALIGHT 100 to ON. By checking the screen of the monitor, rotate the micrometers (X and Y) so that the intersection point of the cross lines*1 (calibrated) comes near the center of the monitor.

*1 Adjust 2 axis that run at right angles to one another by turning the "LIGHT CONT." knob of "MEGALIGHT 100" and the focus ring until the calibration of the cross lines can be seen clearly.



Cross line

(Note) In case the cross lines are tilted, adjust them by turning the chart, which is screwed in the rear tube of the equipment. (Just slight slackness of the chart poses no problems.)



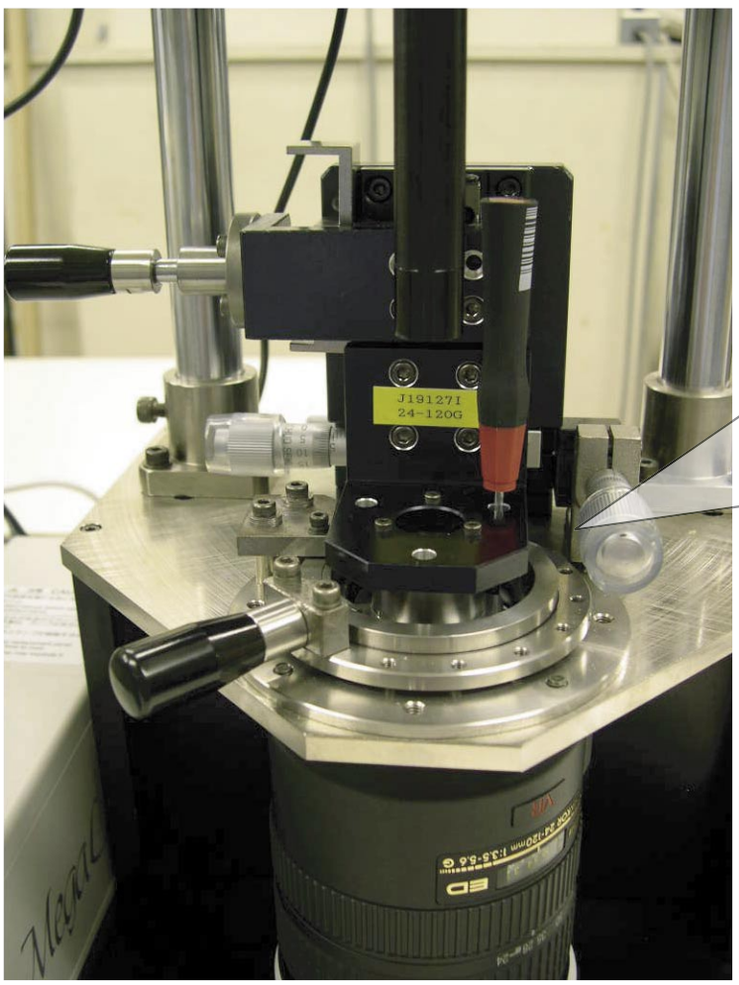
LIGHT CONT. knob

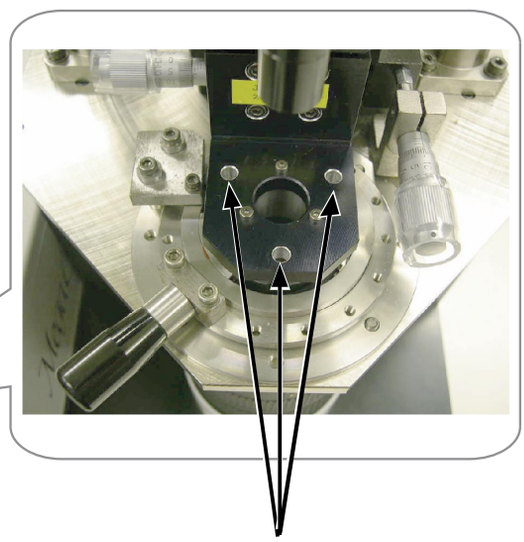
サービス計画課 M

⑩ When the intersection point of the cross lines comes in the center, tighten the 3 screws of the 4th lens chamber with the alignment screwdrivers.

(Note) When the holder is raised, the intersection point of the cross lines is misaligned. So make an adjustment by considering this.

(Note) Because the screws cannot be seen, when inserting the alignment screwdrivers, put them straight down in the screw holes so that the screws can be easily found.





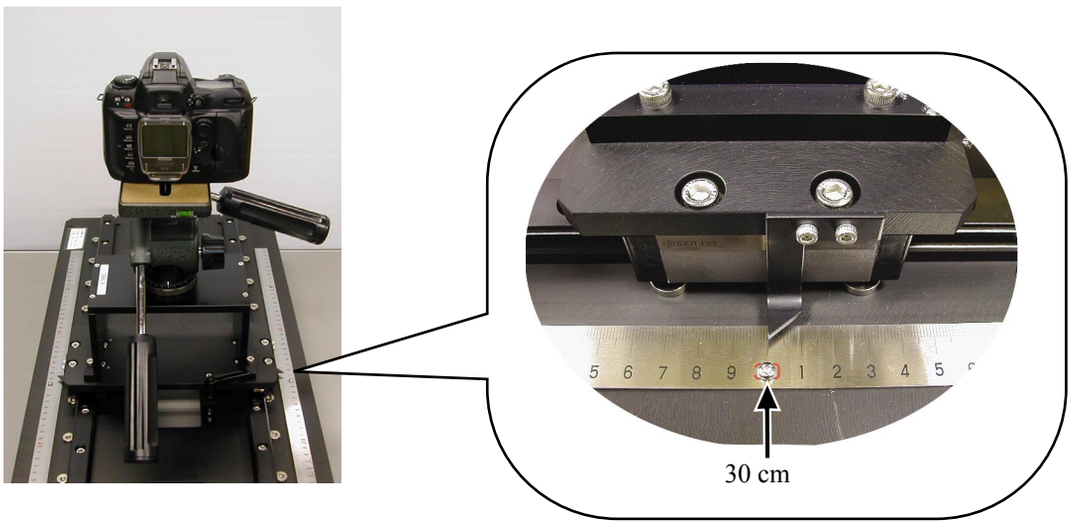
Holes for Screwdrivers

Alignment screwdriver

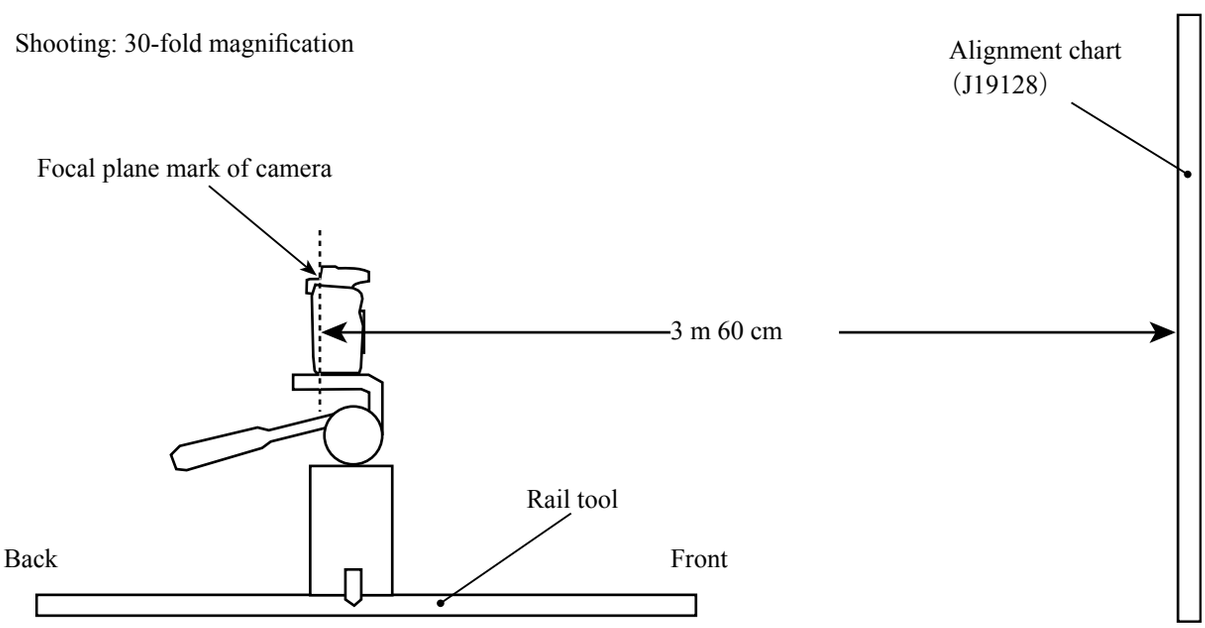
(3) Chart shooting for the 4th lens alignment

① Prepare a camera (D100). Set the shutter speed to “M1/80”and the focus mode to “S”. On the shooting menu, set the Image Quality mode to “RAW”, the WB to “Preset”and the ISO to “200”.

② Set up the camera (D100) on a tripod on the slide rail. Set the indication pointer of the tripod to 30 cm.

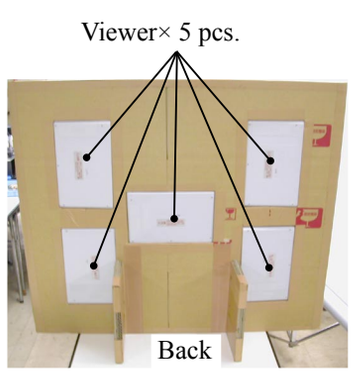


③ Set the alignment chart (J19128) as shown below.



④ Turn the power of viewers (5 pcs.) to ON.

(Note: If the batteries of viewers are exhausted with decreased brightness, the shooting data cannot be obtained.)

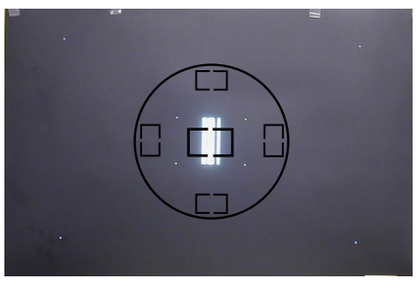


サービス計画課 M

⑤ Fit the lens to be examined in the camera. Set the zoom to TELE (120 mm).
Set the lens focus mode to "M/A", and VR to "OFF".

⑥ By looking through the viewfinder, adjust the height and tilt to make the chart fill the entire finder field frame.

⑦ Adjust the tilt of the slide rail to make the 3 chart lines position in the center of the viewfinder, when the tripod is slid all the way to the front and back.

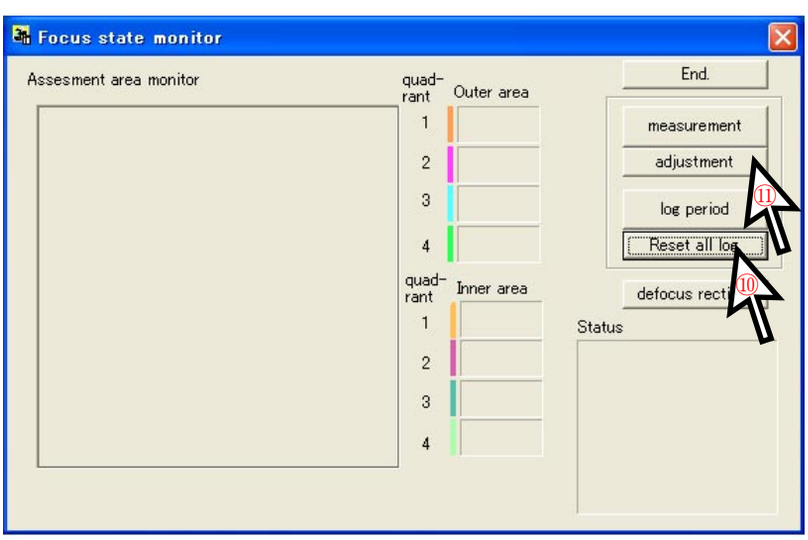


⑧ Connect the PC and camera via USB. (Camera setting: Mass Storage)

⑨ Start the adjustment software (LWM.exe).

⑩ Click the "Reset all log" button.

⑪ Back the tripod to the 30-cm position. Clicking the "Adjustment" button activates the AF of camera to focus, then the shutter is released.

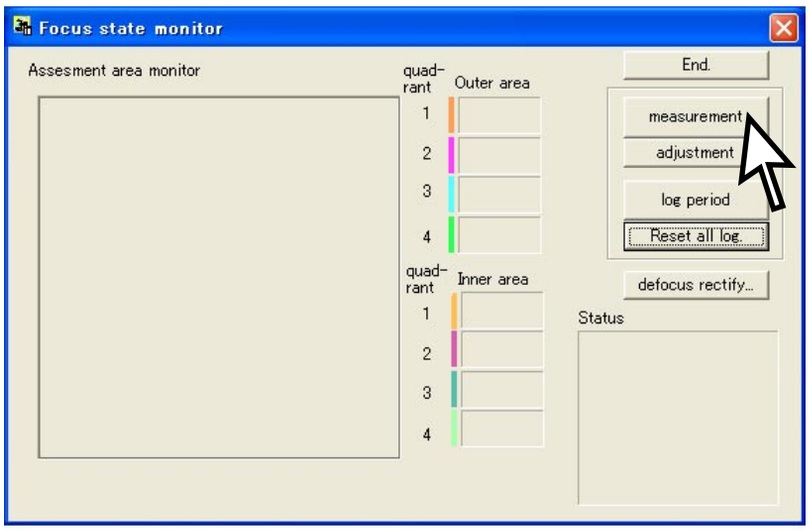


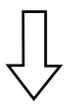
サービス計画課 M

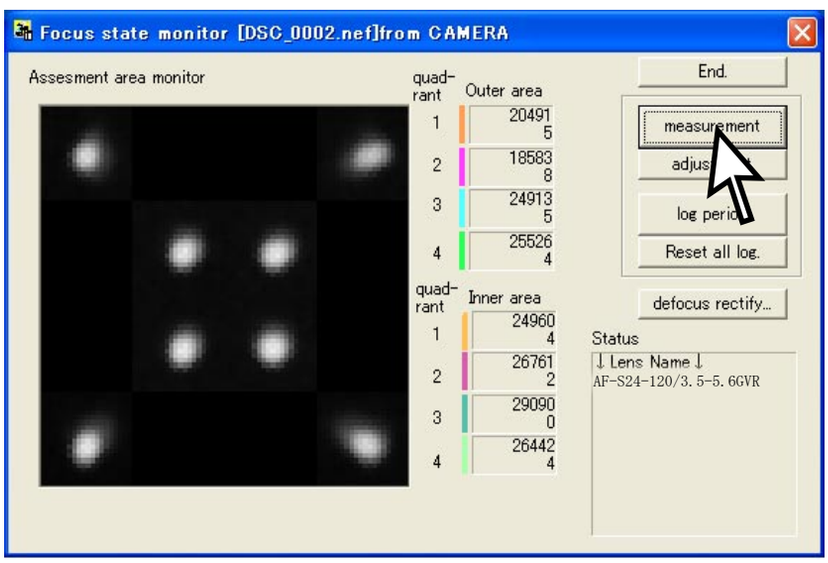
⑫ Set the focus mode of the camera (D100) to "M".

⑬ Slide the tripod to the front by 30 cm.

⑭ Click the "measurement" button of the adjustment software.







⑮ When the shutter of the camera is released, slide the tripod to the back by 10 cm and make a remeasurement.

⑯ Again, slide the tripod to the back by 10 cm and make a remeasurement.
Repeat this operation 4 more times, totalling in 7 measurements. (The total sliding distance is 60 cm.)

Note 1: When the below warning is given, there may be some defects in the brightness of the viewers and/or parallelism of the chart and camera, etc. So correct the above and make a remeasurement.

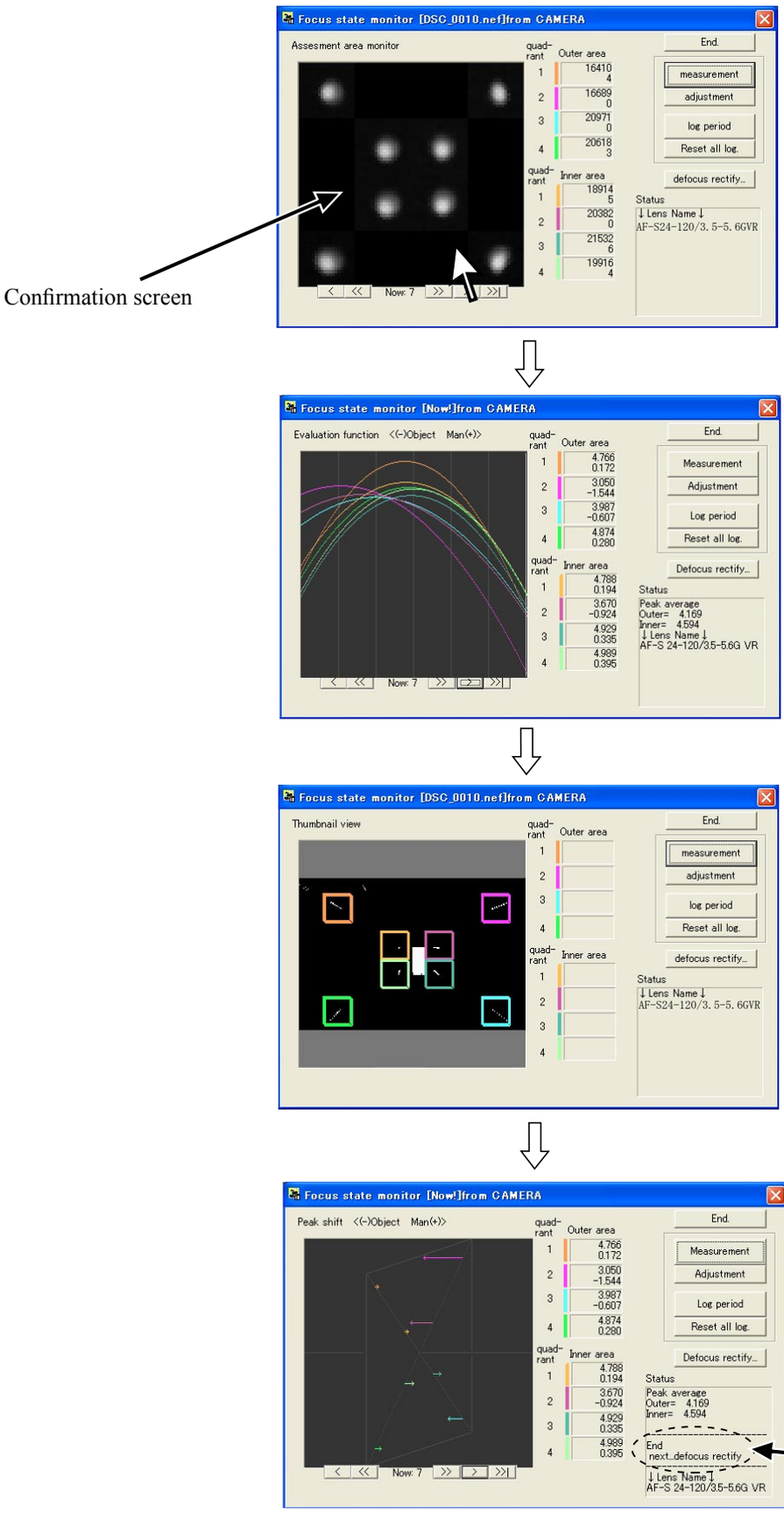
Note 2: When the below warning is given, recheck that the Quality mode of the camera is set to RAW.

Note 3: When the below warning is given, recheck the zoom ring is set to TELE-end.

サービス計画課 M

⑰ After the 7 measurements, point the cursor to the confirmation screen of the software. Click it 3 times, and if "END" is displayed on the Information, the lens optical alignment is completed.

If "END" is NOT displayed (e.g. : X directions:+1, Y directions:-1), go to the next “(4) 4th lens group alignment (periphery alignment)”. In case “Please adjust optical axis” is indicated, make the adjustment of ⑨ of (2) and take the chart shooting of the 4th lens group alignment of (3).

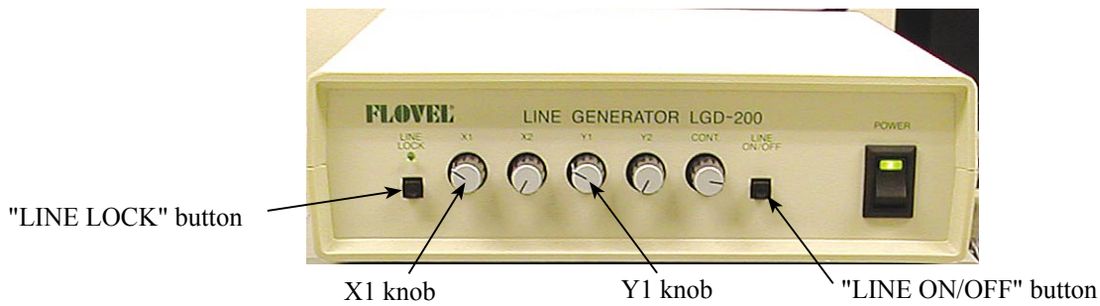


(4) 4th lens group alignment

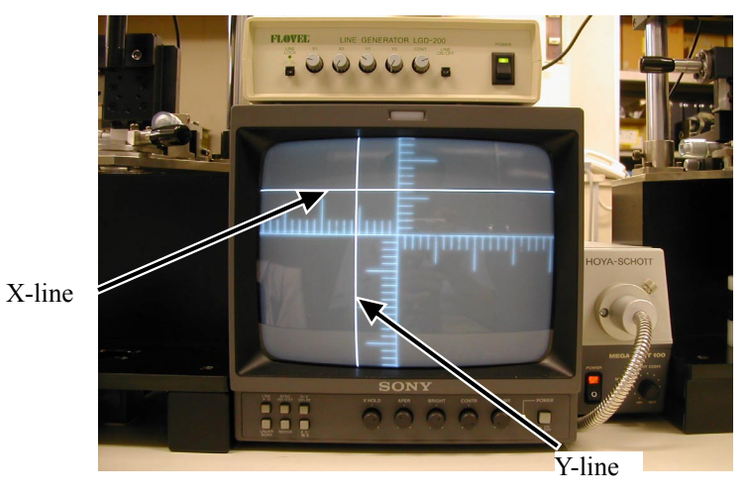
① Fit the lens in the equipment (for center). (ref. ① of (2) for how to fit in it.)

② Turn the power of the monitor, LINE GENERATOR, and MEGALIGHT100 to ON.

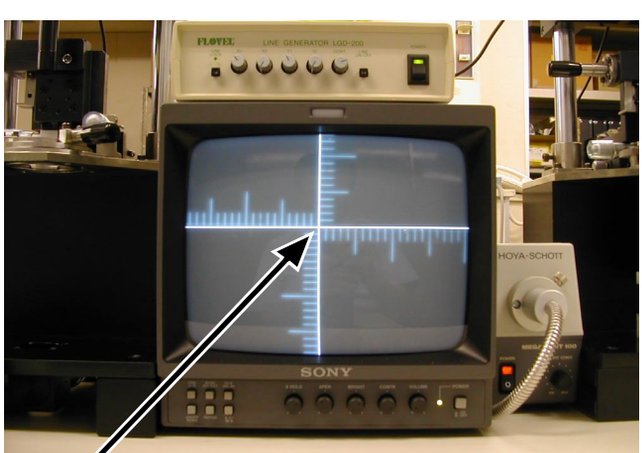
③ Press the "LINE ON/OFF" button of LINE GENERATOR. Turn the knobs of “X1” and “Y1” so that X- and Y-lines are displayed on the monitor.
Superpose these X- and Y-lines on the cross lines of the CCD camera. Then press "LINE LOCK" button to fix these X- and Y-lines.



LINE GENERATOR



⇩



Superpose these X- and Y-lines on the cross lines of the CCD camera. Then press "LINE LOCK" button to fix these X- and Y-lines.

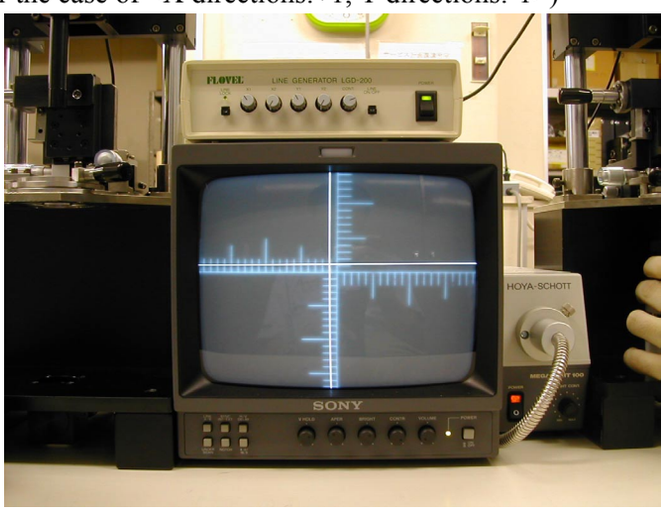
サービス計画課 M

④ Unlock the holder-moving lever, and move the holder down slowly by the lever.

⑤ Insert the alignment screwdrivers into the screw holes of the 4th lens chamber, and loosen the 3 screws.

⑥ Rotate the micrometers (X and Y), and shift the cross lines by the scales that were results of the chart shooting of the 4th lens group alignment.

(e.g. Refer to "Pic.1" for the case of <X directions:+1, Y directions:-1>)



Pic.1

⑦ Fix the 3 screws of the 4th lens chamber with the alignment screwdrivers. Move the holder-moving lever up to lock the holder.

⑧ Check that a shift length caused by the cross lines and the X/Y lines is equal to the scales (1 = 1 scale of the calibrated cross lines) of the results of "Chart shooting of the 4th lens group alignment". (ref. Pic.1)

Note: After fixing the 3 screws of the 4th lens chamber, if a shift length is different from the results of the chart shooting, repeat the procedure from ④ to ⑧ until they become equal.

⑨ Turn each power of the Monitor, LINE GENERATOR,and MEGALIGHT 100 to OFF. Remove the lens from the equipment (for periphery).

Then go back to “(3) Chart shooting of the 4th lens group alignment” and repeat the procedure (3) and (4) until the result becomes "END".

サービス計画課 M

[How to create positioning tool of 4th-lens-group holder for lens alignment (AF-S VR 24-120/3.5-5.6G)]

It is the same tool with AF-S ED 24-85/3.5-4.5G

1: Summary

1-1: This is a positioning tool of the 4th lens group holder for lens alignment, in order to secure the position for attaching the 4th lens group temporarily.

2: Preparation

2-1: The following is used:

* Rear cover ring (JAA78071- Part no. :1K631-287) X 1 pc.
* Bayonet mount (JAA78071- Part no.: 1K404-157) X 1 pc.
* Mount rotation stopper screw (JAA78071- Part no.: 1K120-012) X 1 pc.

3. Procedure

3-1: Put the bayonet mount as shown in Fig. 1.

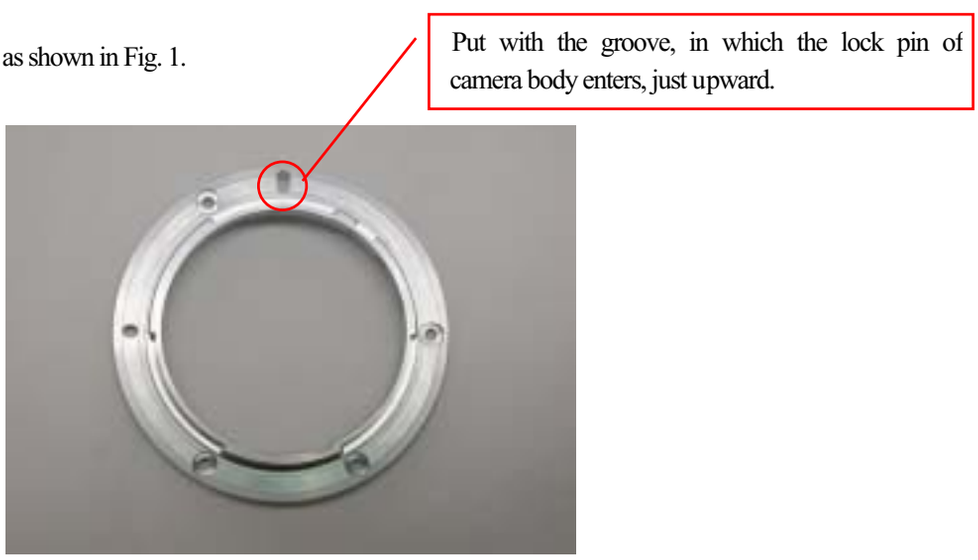


Fig. 1

3-2: Mount the reversed rear cover ring on the position of Fig. 1, and attach them as shown in Fig. 2.

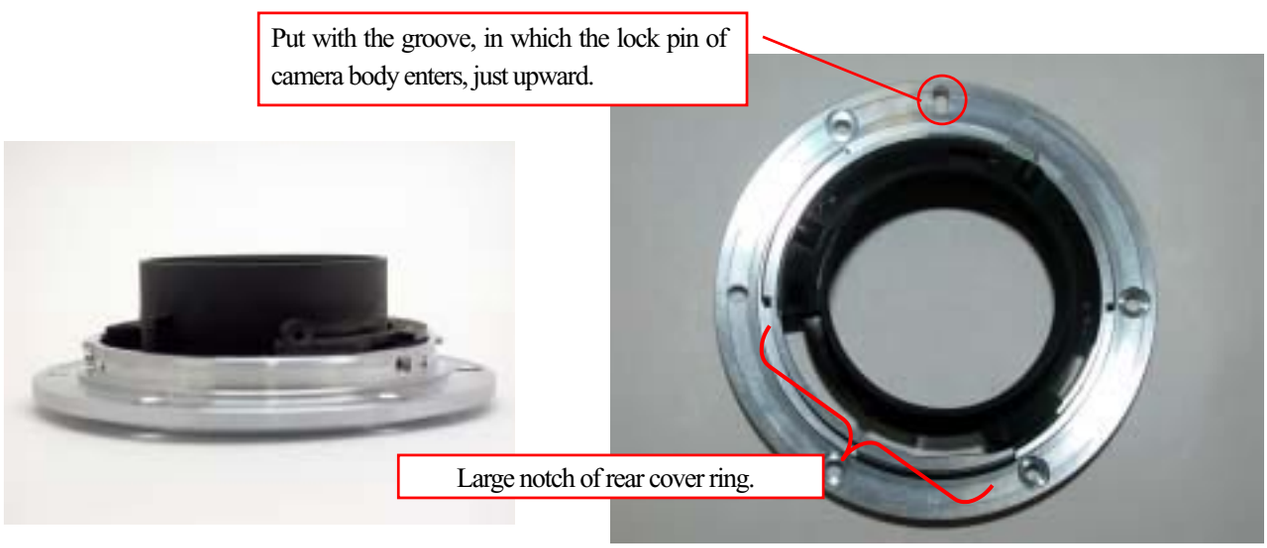


Fig. 2

サービス計画課 M

3-3: Turn the rear cover ring clockwise, which was attached to the bayonet mount. Then stop at the position as shown in Fig.3-1.

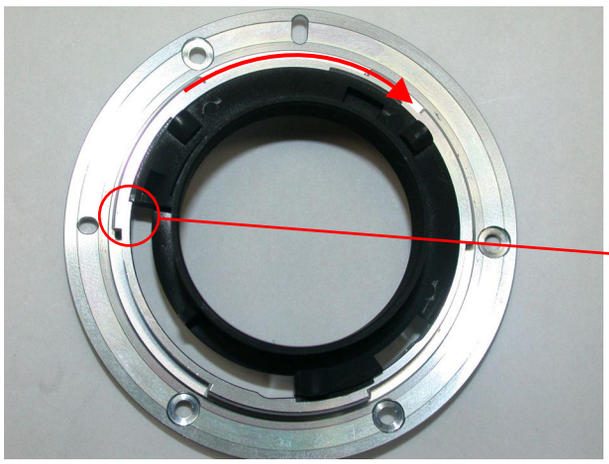


Fig. 3

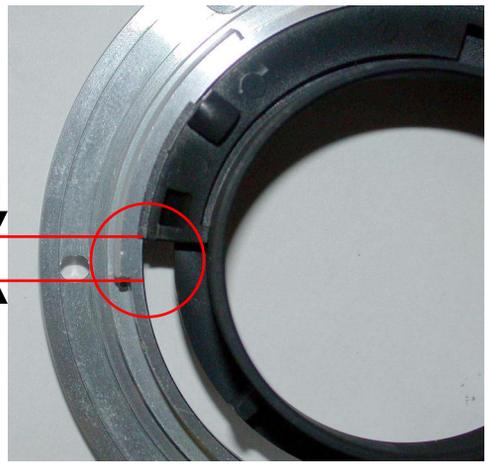


Fig. 3-1

3-4: Fix the following 3 locations of the rear cover ring with the instant adhesive.

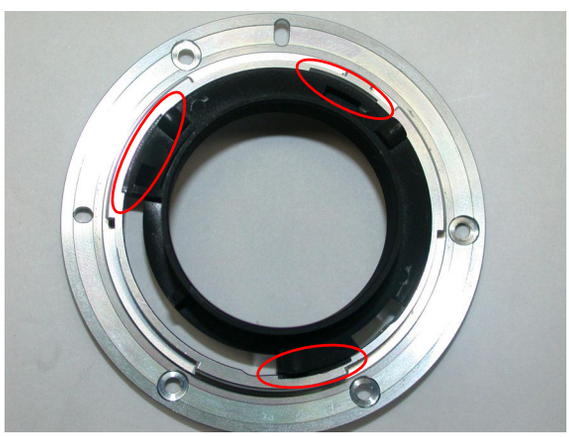
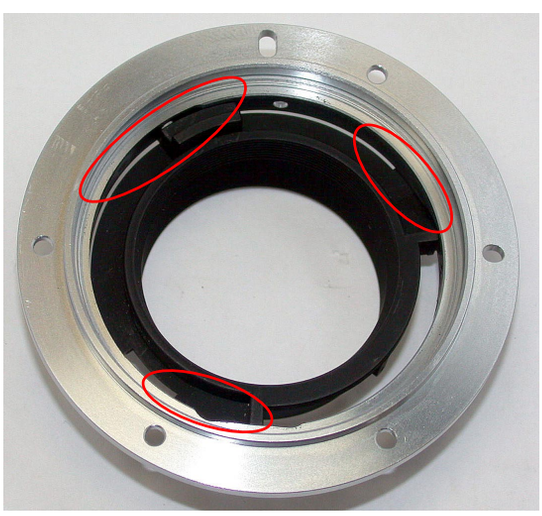


Fig. 4

3-5: Turn the bayonet mount over. Reinforce the following 3 locations with the adhesive to attach the bayonet mount and rear cover ring firmly.



3-6: Attach the mount rotation stopper screw at the appropriate position.

サービス計画課 M

[How to create Setting board of "Lens alignment chart" and "Viewer"]

1. Summary

1-1: In order to get necessary data for lens alignment, this board is created to use for setting a special chart and light viewers (for chart illumination), while taking pictures of the special chart with a digital camera.

2. Preparation

2-1: Prepare a board (760 x 880 x 20 mm) or 2 package cardboard boxes (size 2.33).
(Note) Because you have to cut out the shape to embed light viewers, choose package cardboard boxes (size 2.33) or material which can be easily cut. - ref. Fig. 1

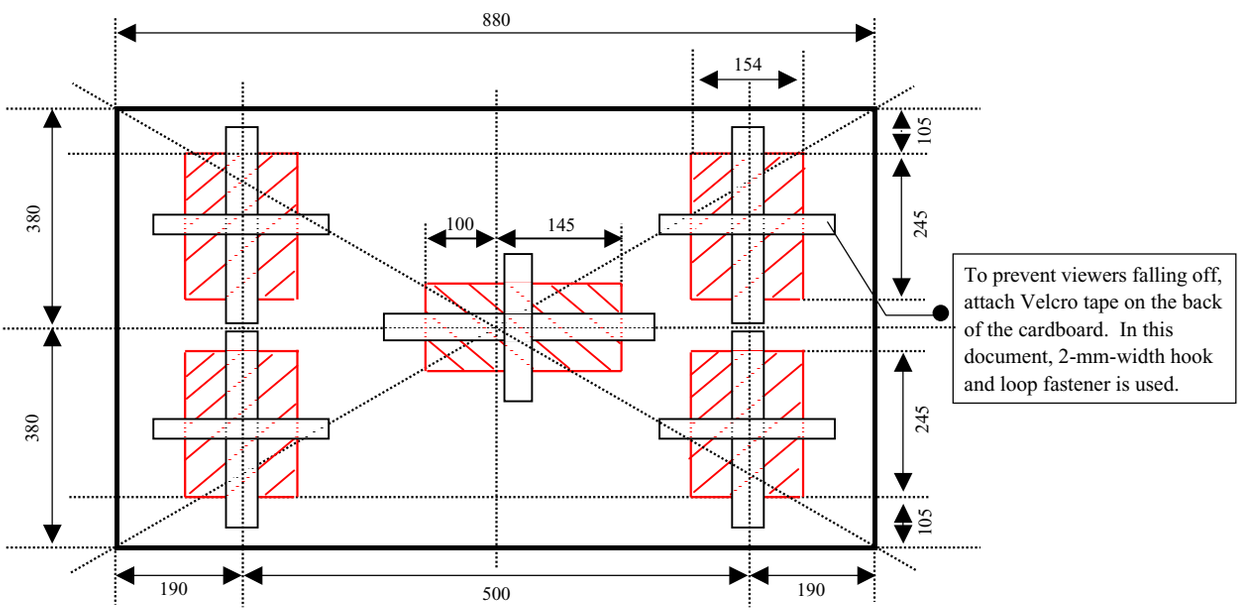
3. Procedure (In this document, 2 package cardboards are used)

3-1: As for the 1st flattened cardboard box (size 2.33), check the positions for embedding the light viewers, and cut out the shape at 5 locations (shaded parts/size 154 x 245 mm) as shown below. - ref. Fig. 2
(Note) Cutting the shape slightly smaller than the light viewers.

3-2: Put the 2nd flattened cardboard box (size 2.33) and the above cut-out 1st cardboard together as one, and fix them by taping at 4 sides. - ref. Fig. 3

3-3: Then as for the 2nd flattened cardboard box, cut out the shape again by matching the cut-out size of 3-1 for each viewer. - ref. Fig. 4

3-4: Reinforce the edges of cut-out parts with tape.
(Note) To prevent viewers falling off, secure them with tape around the edges. - ref. Fig. 5



4. Prevent Viewers from falling off (In this document, 2-mm width Velcro tape is used.)

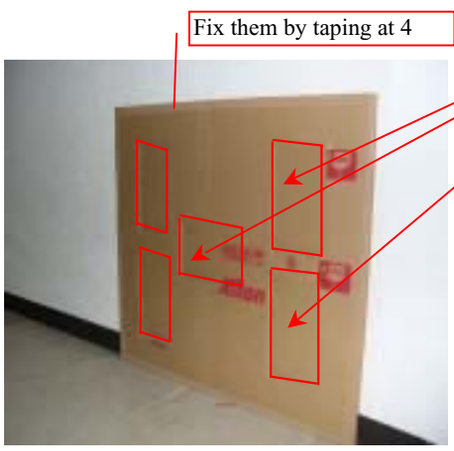
4-1: As shown above, when viewers are embedded, secure them with square pieces of Velcro tape (hook and loop fastener) on the back of the cardboard to prevent viewers falling off.

サービス計画課 M

(Fig. 1 - Prepare 2 package cardboard boxes, and flatten them as below.)

(Fig. 2 - As for the 1st flattened cardboard box, cut out the <154 x 245 mm sized> shape at 5 locations.)

(Fig. 3 - Package cardboard boxes)
Put the 2nd flattened cardboard boxe and the 1st cut-out cardboard together as one as shown below.



(Fig. 4 - As for the 2nd flattened cardboard box, cut out the shape in the same way as Fig.2. All cardboards are cut out as below.)

Cut out by matching the size of the 1st cutting.

(Fig. 5- Light viewers are embedded.)

(Fig. 6 - Chart is attached.)

サービス計画課 M

ADJUSTMENT (DIVISION) OF FOCUS MOVEMENT (TELE, WIDE)

● Align the infinity (∞) mark of the focus ring with the index.

● Fix the aperture lever so that the aperture is fully opened.

[2nd group washer]

1. Read each value on the 70 mm and WIDE sides.
2. Calculate as follows:

A － B ＝ C

A＝ Value of 70 mm side

B＝ Value of WIDE side

C＝ Adjustment amount (mm) of the 2nd lens group washer (#57)

3. Adjust the thickness of the washer (#57) for the above amount of C value. If C is positive, thicken the washer. If negative, thin the washer.

[1st group washer]

1. Read each value on the TELE and WIDE sides.
2. Calculate as follows:

A － B ＝ C

A＝ Value of TELE side

B＝ Value of WIDE side

C＝ Adjustment amount (mm) of the 1st lens group washer (#86)

3. Adjust the thickness of the washer (#86) for the above amount of C value. If C is positive, thicken the washer. If negative, thin the washer.

Caution : When putting in washers, place a thin washer between thick washers.

ADJUSTMENT OF BACK-FOCUS

1. Align the infinity (∞) mark of the focus ring with the index.
2. Fix the aperture lever so that the aperture is fully opened.
3. Read each value of WIDE or TELE side.
4. Remove the bayonet mount.
5. Adjust the thickness of the washer (#125) for the difference from the standard value. If the difference value is positive, thicken the washer. If negative, thin the washer.

Focal length （ｆ）	Standard （ｍｍ）
２４ｍｍ	－０．０５～＋０．０６
５０ｍｍ	－０．０７～＋０．１７
７０ｍｍ	－０．０７～＋０．１７
１２０ｍｍ	－０．１０～＋０．２２

PREPARATION FOR INSPECTION / ADJUSTMENT OF MAIN PCB

●In case of replacing the main PCB, SWM unit or MR encoder unit, be sure to make the necessary adjustments as follows:

1. Adjustments
   - Adjust the MR duty
   - Adjust the driving frequency and motor control

2. Equipment and tools to be required
   - Single output rated voltage power supply: 1 unit

     For contact A to mount: Output of the DC/DC converter (5.5V 100mA)
     For contact F to contact G: 6.0V 3.0A

   - Oscilloscope: 1 unit

     For adjusting the MR duty, the driving frequency and motor control

   - AF-I communication box (J15306 or J15306-1): 1 unit

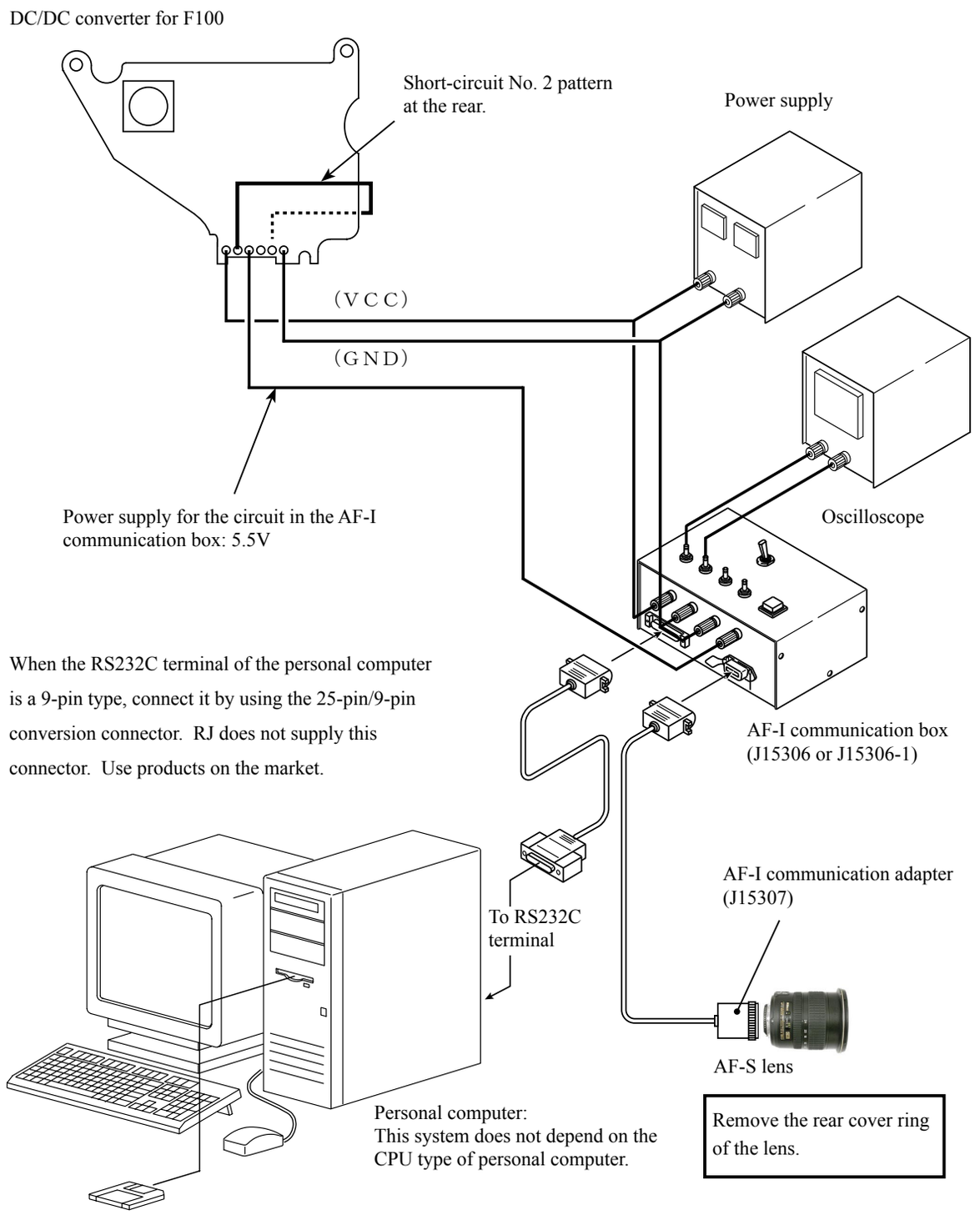
   - AF-I communication adapter (J15307): 1 unit

【System configuration】

By using the DC/DC converter, one unit of rated voltage power supply can provide the necessary source of electricity to this system.

The below is an example of using the DC/DC converter for F100. The explanations will be made after the next page on the assumption of this modified example.

In J15306-1 of AF-I communication box, the DC/DC converter is already built in.


DC/DC converter for F100
Short-circuit No. 2 pattern at the rear.
Power supply
(VCC)
(GND)
Power supply for the circuit in the AF-I communication box: 5.5V
Oscilloscope
When the RS232C terminal of the personal computer is a 9-pin type, connect it by using the 25-pin/9-pin conversion connector. RJ does not supply this connector. Use products on the market.
AF-I communication box (J15306 or J15306-1)
AF-I communication adapter (J15307)
To RS232C terminal
AF-S lens
Personal computer:
This system does not depend on the CPU type of personal computer.
Remove the rear cover ring of the lens.
AF-S zoom lens inspection and adjustment software (J18342)

ADJUSTMENT OF MR DUTY

●In case of replacing the main PCB, SWM unit and MR encoder unit, be sure to make adjustments.

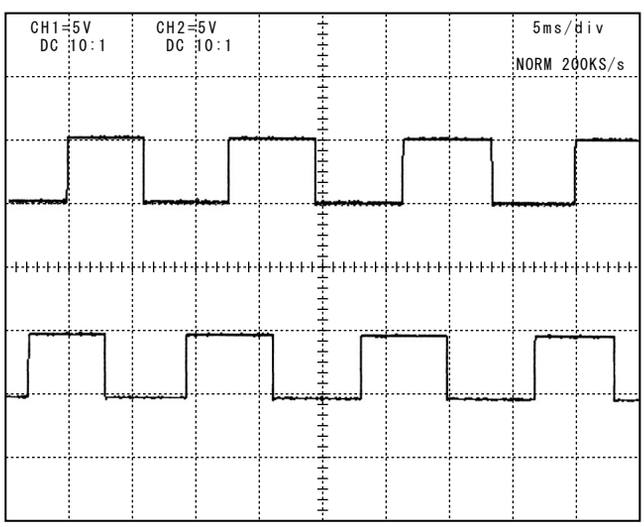
How to adjust

① Make sure that the electric current and voltage of the connected rated voltage power supply are set to the set values. Then, turn the rated voltage power supply ON for the contacts A and F.

② Select "1. MR DUTY ADJUSTMENT" in the menu of the AF-S zoom lens (New) inspection program.

③ The confirmation screen for writing the fixed values in EEPROM appears. Select the appropriate item.

④ Following the instruction on the screen, rotate the MF ring slowly by hand in the direction from the infinity to the close distance position. Make sure that the waveform on the oscilloscope has duty 50% and stop the MF ring at the close distance-end.



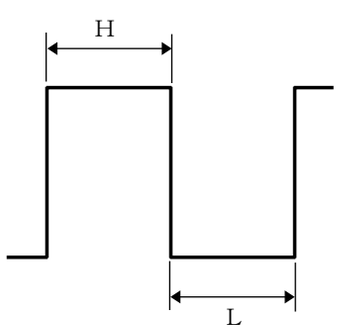
● Setting of oscilloscope

V/Div（CH1）	: 5V
V/Div（CH2）	: 5V
Coupling	: DC
Time/Div	: 5 m Sec
Trigger Mode	: NORMAL
Trigger Coupling	: DC
Trigger Source	: CH 1
Trigger Position	: +4 div
Trigger Type	: EDGE
Trigger Level	: 2.5 V

⑤ Following the instruction on the screen, rotate the MF ring slowly by hand in the direction from the close distance to the infinity position. Make sure that the waveform on the oscilloscope has duty 50% and stop the MF ring at the infinity-end.

Note : In case the waveform from infinity to close distance position or vice versa does not have duty 50%, repeat "INSPECTION AND ADJUSTMENT OF THE MR ENCODER OUTPUT WAVEFORM" on Page L15.

Sandard　H : L = 100 : 206 ～ 206 : 100（50% ±17.3%）



ADJUSTMENT OF DRIVING FREQUENCY AND MOTOR CONTROL

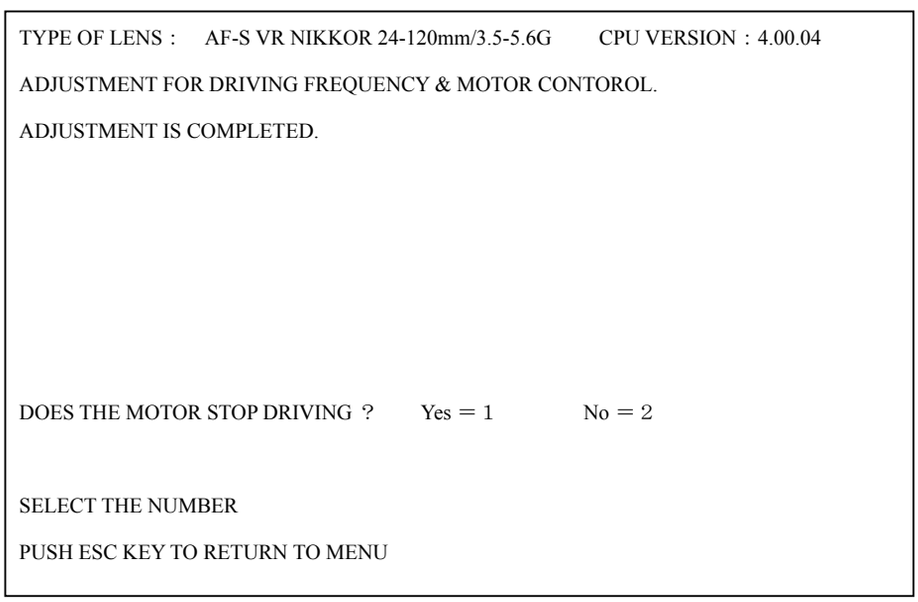
● In case of replacing the main PCB, SWM unit and MR encoder unit, be sure to make adjustments.

① The method of connetion of the rated voltage power supply and measuring tools is the same as "ADJUSTMENT OF MR DUTY".

② Make sure that the electric current and voltage of the rated voltage power supply are set to the set values.

③ Turn the rated voltage power supply ON.

④ Select "2. ADJUSTMENT FOR DRIVING FREQUENCY & MOTOR CONTROL" in the menu of the AF-S zoom lens (New) inspection program. The lens automatically starts the driving of scanning.


TYPE OF LENS : AF-S VR NIKKOR 24-120mm/3.5-5.6G CPU VERSION : 4.00.04
ADJUSTMENT FOR DRIVING FREQUENCY & MOTOR CONTOROL.
ADJUSTMENT IS COMPLETED.
DOES THE MOTOR STOP DRIVING ? Yes = 1 No = 2
SELECT THE NUMBER
PUSH ESC KEY TO RETURN TO MENU

⑤ In case the motor driving remains stopped when the above screen appears, select "1" to end the adjustment.
If the motor drive does not stop,select "2" and make the following manual adjustment. If a proper adjustment is not made even after selecting "1", "COULD NOT BE EXECUTED." is displayed, followed by the manual adjustment.
If the adjustment cannot be made even by the manual adjustment, SWM unit or cam ring unit is regarded as malfunctioning

⑥ Manual adjustment

In case the motor does not stop or automatic adjustment cannot be made, “Fig. 1” is displayed on the screen. At this moment, pressing “1” performs the automatic adjustment again.

If the adjustment cannot be made even after making several automatic adjustments, press “2” for manual adjustment in the following screen.

```
ADJUSTMENT FOR DRIVING FREQUENCY & MOTOR CONTROL.




IF ADJUSTMENT CANNOT BE MADE, MAKE MANUAL ADJUSTMENT.
 1. MAKE AUTOMATIC ADJUSTMENT AGAIN.
 2. MAKE MANUAL ADJUSTMENT.

SELECT THE NUMBER.
PUSH ESC KEY TO RETURN TO MENU.
```

Fig. 1

First, make a low-speed adjustment then a high-speed adjustment.

1. Based on “Fig. 2” on the screen, set the low-speed adjustment for lens and oscilloscope.
   Connect the probe of the oscilloscope to the E terminal of the communication-BOX.
   Connect GND of the probe to GND of the communication-BOX.
2. Set the oscilloscope so that the time of one cycle of the waveform for E terminal of AF-I communications BOX can be seen.
   The time of waveform varies according to the key operation of “1”, “3” , “4”, and “6” , so adjust the time within standard.
   The standard shows average value, so someitmes it is acceptable to become an out-of-standard value.
3. Make a high-speed adjustment by following the above same procedure. (Be careful of a different value of standard.)

```
TYPE OF LENS :  AF-S VR 24-120mm/3.5-5.6G        CPU VERSION :  3.02.00

ADJUSTMENT FOR DRIVING FREQUENCY & MOTOR CONTROL.

PLACE LENS IN A HORIZONTAL POSITION.

LOW-SPEED ADJUSTMENT

SET OSCILLOSCOPE TO E-TERMINAL OF AF-I COMMUNICATION BOX.

OSCILLOSCOPE SETTING
          TIME/DIV : 500us/div
      Trigger Mode : NORMAL
  Trigger Position : -4div
            CURSOR : T1= 1.11div , T2= 2.24div
          STANDARD : 2555us - 3120us

ADJUST SO THAT THE TIME OF ONE CYCLE OF WAVEFORM FALLS APPROXIMATELY
WITHIN STANDARD.

 1. - FINE ADJUSTMENT      3. + FINE ADJUSTMENT
 4. - ROUGH ADJUSTMENT     6. + ROUGH ADJUSTMENT

PUSH ENTER KEY TO FORWARD NEXT STEP.

PUSH ESC KEY TO RETURN TO MENU.
```

Set value of Oscilloscope DL1540

Fig. 2

e.g.) Oscilloscope (DL1540) setting

As shown in Fig. 2, “div” value within standard is displayed on PC screen.

As shown in Fig. 3, it becomes easy to judge if the standard range of cycle of waveform is set by cursor.

The standard value, TIME/DIV, and CURSOR(T1,T2) varies according to the conditions of low-speed adjustment, high-speed adjustment, and other lenses, etc, so check by Fig. 2 of the PC screen when adjustment is made.

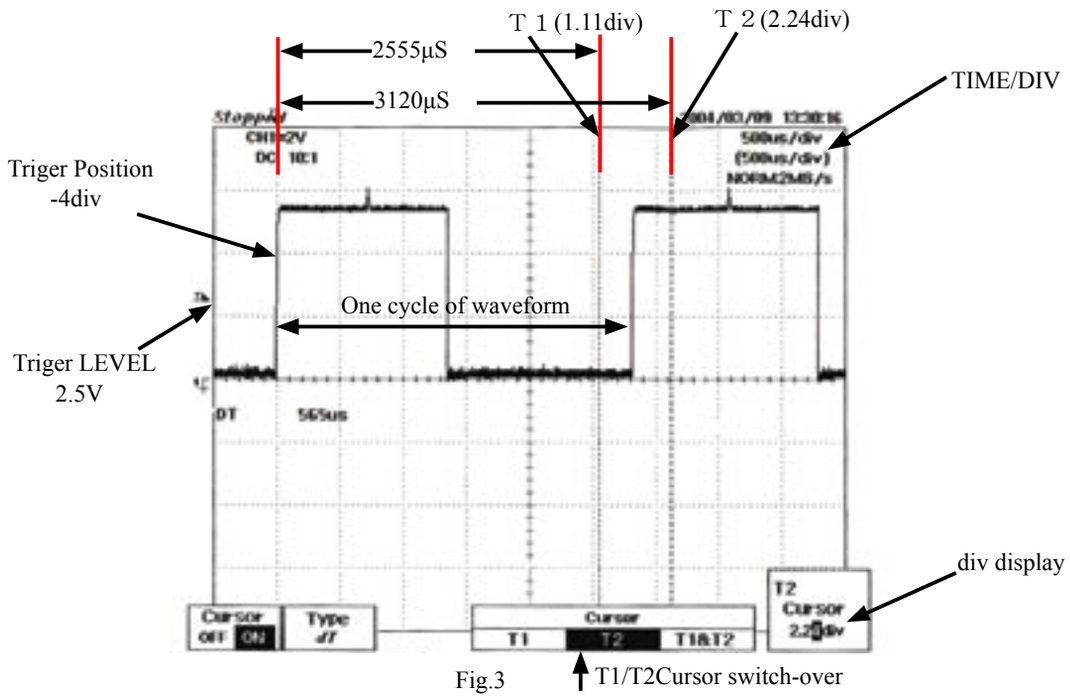


Fig.3 T1/T2Cursor switch-over

INSPECTION OF LENS OPERATIONS

Check the lens operations by using a personal computer after assembling.

○Check by personal computer

● Check by the following considerations:

1. MR encoder operations

・Drive the scanning of lens and check the difference in pulses at the start and end.

・In case the MR head of the MR encoder is malpositioned on the magnetic tape, the difference in pulses gets large.

2. Lens-servo stop accuracy

・Check the number of overrun/underrun pulses (deviation of the stop position from the target position) per the specified lens driving.

・In case the irregularity of mechanical operations does not take place in the focus ring driving unit, the underrun tends to occur if it is heavy in the cam ring rotation of the MR encoder, while the overrun tends to occur if it is light in its rotation of the MR encoder.

3. Lens-servo time

・Check the servo time (from starting and stopping the servo) when driving the specified lens by using the oscilloscope.

・In case the irregularity of mechanical operations does not take place in the focus ring driving unit, the servo-time tends to be long if it is heavy in the cam ring rotation of the MR encoder, while the servo-time tends to be short if it is light in its rotation of the MR encoder.

4. Switches and lenses

・Check the ON/OFF operations of switches, the distance encoder and zoom encoder.

● After inspections

1. When the MR encoder operations are not up to the standard:

Readjust the MR duty. (ref. Page L28.)

In case the pulse is not up to the standard, adjust the output waveform of the MR encoder again. (ref. Page L15.)

In case the pulse meets the standard, replace the cam ring unit.

2. When the lens-servo stop accuracy is not up to the standard:

Check the output waveform of the MR encoder. If it is normal, replace the cam ring unit.

3. When the lens-servo time is not up to the standard:

Readjust the driving frequency and motor control.

In case the lens-servo time is not up to the standard even after the readjustment, replace the cam ring unit.

4. When switches do not work properly:

Check the wiring state of the troubled switch or replace it.

●AF-S zoom lens (New) inspection program

（1） Menu screen

```
NIKON AF-S ZOOM LENS(NEW)INSPECTION ／ ADJUSTMENT PROGRAM.        [J18342]
1. ADJUSTMENT FOR MR DUTY.                  9. ----------------------
2. ADJUSTMENT FOR FREQUENCY & CONTROL       A  ----------------------
3. READING AND REWRITING OF EEPROM DATA.    B. ----------------------
4. OPERATION OF MR ENCODER.                 C. ----------------------
5. LENS-SERVO DRIVING STOP ACCURACY.        D. ----------------------
6. LENS-SERVO TIME.                         E. ----------------------
7. SWITCHES AND LENS CONDITIONS.            F. ----------------------
8. ----------------------                  G. RETURN TO THE SYSTEM.
SELECT THE APPROPRIATE ITEM BY 〈－ －〉 KEY, AND PUSH THE RETURN KEY.
                                        COMMUNICATE BY RS232C TERMINAL.
OR SELECT THE APPROPRIATE NUMBER.    FOR IBM PC/AT DOS/V CLONE.(486-PENTIUM3)
                                    COPYRIGHT(C)2003-05-10 NIKON CORP.
          BORLAND C++ VERSION 3.1 COPYRIGHT(C)1992 BORLAND INTERNATIONAL.
```

・Menu items

The items 1 and 2 are used for adjustments.

The item 3 is used for reading and writing EEPROM DATA.

The items 4~7 are used for inspections.

・Selection items

After selecting items screens appear, such as the lens selection, the focal length selection, the voltage setting, the inspection mode start.

The screens depend on the items. Follow the instructions of the personal computer.

・Operating voltage

	Power supply for AF motor inside lens	Power supply for AF-I communication box
Inspection of MR encoder operation	6.0 ± 0.1 V	5.5± 0.2 V
Inspection of lens-servo stop accuracy	6.5 ± 0.1 V	
Inspection of lens-servo time	6.5± 0.1 V	
Inspection of switches and lenses	6.0 ± 0.1V	

・Initial driving

When "WAIT FOR SOME SECONDS" appears, perform the initial driving (drive scanning five times and stop at infinity-end).

（２）Inspection of MR encoder operations

TYPE OF LENS： AF-S VR NIKKOR 24-120mm/3.5-5.6G CPU VERSION：3.03.00

OPERATION OF MR ENCODER OPERATIONS.

INSPECTING.

PUSH ANY KEY TO FORWARD TO NEXT STEP.

Caution：If the MF ring is rotated while the lens scanning is driven, the pulse shows an abnormal value.
Do NOT touch the MF ring during operations.
Make inspections at the 5 positions as below.

(Lens position in inspecting)

Lens inclination	Position of index window
Horizontal	Up, right and left
Front lens group 90° upward	
Front lens group 90° downward	

When the inspection ends, the above screen appears.

Press any key to display the inspection result of the next page.

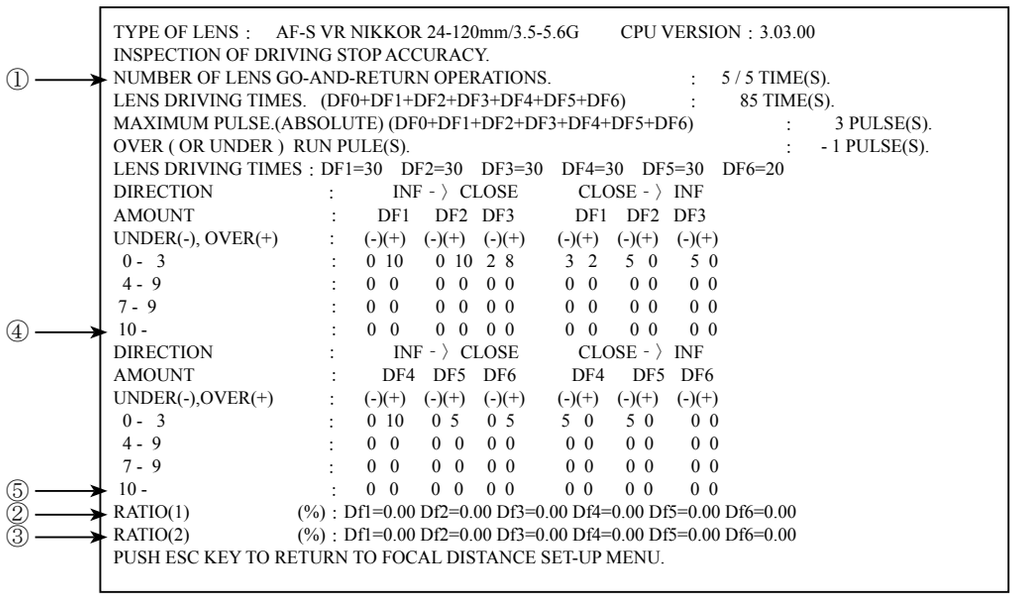
The difference in pulse before and after the inspection must be within the standard.

Standard of the difference in pulse : 0 ± 10 PULSE(S)

Standard of the total pulses : 2990 ± 114 PLUSE(S)

```
TYPE OF LENS :   AF-S VR NIKKOR 24-120mm/3.5-5.6G      CPU VERSION : 3.03.00
INSPECTION OF MR ENCODER OPERATIONS.

POSITION WHEN CHECK BEGINS.  [PULSE(S)]      ------------  3
POSITION WHEN CHECK ENDS.[PULSE(S)]          ------------ 12
PULSE NUMBER DIFFERENCE BEFORE / AFTER CHECKS.[PULSE(S)] -- -9
STANDARD FOR DIFFERENCE IN PULSE NUMBER : FROM  -10  TO   10 [PULSE(S)]
                                                    IN STANDARD.
＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊＊
THE TOTAL NUMBER OF PULSE(S) AT INSPECTION.    [PULSE(S)]      2370
STANDARD FOR THE TOTAL PULSE NUMBER : FROM 2876 TO 3104 [PULSE(S)]
                                                    N STANDARD.
PUSH ESC KEY TO RETURN TO MENU.
```

（３）Inspection of lens-servo stop accuracy


TYPE OF LENS : AF-S VR NIKKOR 24-120mm/3.5-5.6G CPU VERSION : 3.03.00
INSPECTION OF DRIVING STOP ACCURACY.
① NUMBER OF LENS GO-AND-RETURN OPERATIONS. : 5 / 5 TIME(S).
LENS DRIVING TIMES. (DF0+DF1+DF2+DF3+DF4+DF5+DF6) : 85 TIME(S).
MAXIMUM PULSE.(ABSOLUTE) (DF0+DF1+DF2+DF3+DF4+DF5+DF6) : 3 PULSE(S).
OVER (OR UNDER) RUN PULE(S). : - 1 PULSE(S).
LENS DRIVING TIMES : DF1=30 DF2=30 DF3=30 DF4=30 DF5=30 DF6=20
DIRECTION : INF - 〉 CLOSE CLOSE - 〉 INF
AMOUNT : DF1 DF2 DF3 DF1 DF2 DF3
UNDER(-), OVER(+) : (-)(+) (-)(+) (-)(+) (-)(+) (-)(+) (-)(+)
0 - 3 : 0 10 0 10 2 8 3 2 5 0 5 0
4 - 9 : 0 0 0 0 0 0 0 0 0 0 0 0
7 - 9 : 0 0 0 0 0 0 0 0 0 0 0 0
④ 10 - : 0 0 0 0 0 0 0 0 0 0 0 0
DIRECTION : INF - 〉 CLOSE CLOSE - 〉 INF
AMOUNT : DF4 DF5 DF6 DF4 DF5 DF6
UNDER(-),OVER(+) : (-)(+) (-)(+) (-)(+) (-)(+) (-)(+) (-)(+)
0 - 3 : 0 10 0 5 0 5 5 0 5 0 0 0
4 - 9 : 0 0 0 0 0 0 0 0 0 0 0 0
7 - 9 : 0 0 0 0 0 0 0 0 0 0 0 0
⑤ 10 - : 0 0 0 0 0 0 0 0 0 0 0 0
② RATIO(1) (%) : Df1=0.00 Df2=0.00 Df3=0.00 Df4=0.00 Df5=0.00 Df6=0.00
③ RATIO(2) (%) : Df1=0.00 Df2=0.00 Df3=0.00 Df4=0.00 Df5=0.00 Df6=0.00
PUSH ESC KEY TO RETURN TO FOCAL DISTANCE SET-UP MENU.

Caution : If the MF ring is rotated while the lens scanning is driven, the pulse shows an abnormal value. Do NOT touch the MF ring during operations.

During the lens driving, the above screen is displayed. Make inspections at the 5 positions as below.

(Lens position in inspecting)

Lens inclination	Position of index window
Horizontal	Up, right and left
Front lens group 90° upward	
Front lens group 90° downward	

The number of overrun/underrun pulses must be within the standards after the 5 lens back-and forth driving motions ("5/5TIME (S)." in [1] of the display).

Standard RATIO (1) is 40% or less for Df1~Df6. ② of the screen
(Occurrence ratio of 4~9 pulses)

RATIO (2) is 10% or less for Df1~Df6. ③ of the screen
(Occurrence ratio of 7~9 pulses)

Occurrence of 10 or more pulses is zero for Df1~Df6. ④ and ⑤ of the screen
(Only one occurrence indicates malfunction.)

※ "Df1~Df6" shows the lens driving amount.

（4）Inspection of lens-servo time

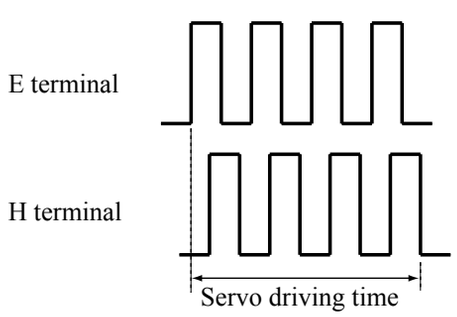
```
TYPE OF LENS :   AF-S VR NIKKOR 24-120mm/3.5-5.6G      CPU VERSION : 3.03.00
INSPECTION OF LENS SERVO TIME.
------------------------------------------------------------
  SERVO AMOUNT.          STANDARD.
1. [ Df1 ]               70ms   OR LESS.
2. [ Df2 ]               90ms   OR LESS.
3. [ Df3 ]              100ms   OR LESS.
4. [ Df4 ]              115ms   OR LESS.
5. [ Df5 ]              135ms   OR LESS.
6. [ Df6 ]              155ms   OR LESS.
------------------------------------------------------------
7. DRIVE  TO INFINITY.
8. DRIVE  TO CLOSE.
9. RETURN TO FOCAL DISTANCE SET-UP MENU.

SELECT THE NUMBER.
PUSH ESC KEY TO RETURN TO MENU.
```

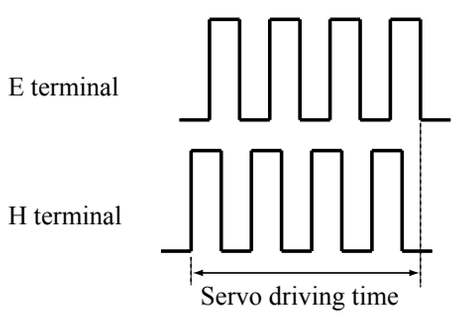
Connect the probes of oscilloscope to E and H terminals of the AF-I communication box (J15306). Select the servo driving amount respectively. Each lens-servo drive time must be within the standard.

Caution : If the MF ring is rotated during inspections, the waveform shows an abnormal value. Do NOT touch the MF ring during inspections. Make inspections at the 5 positions as below.

(Lens position in inspecting)

Lens inclination	Position of index window
Horizontal	Up, right and left
Front lens group 90° upward	
Front lens group 90° downward	



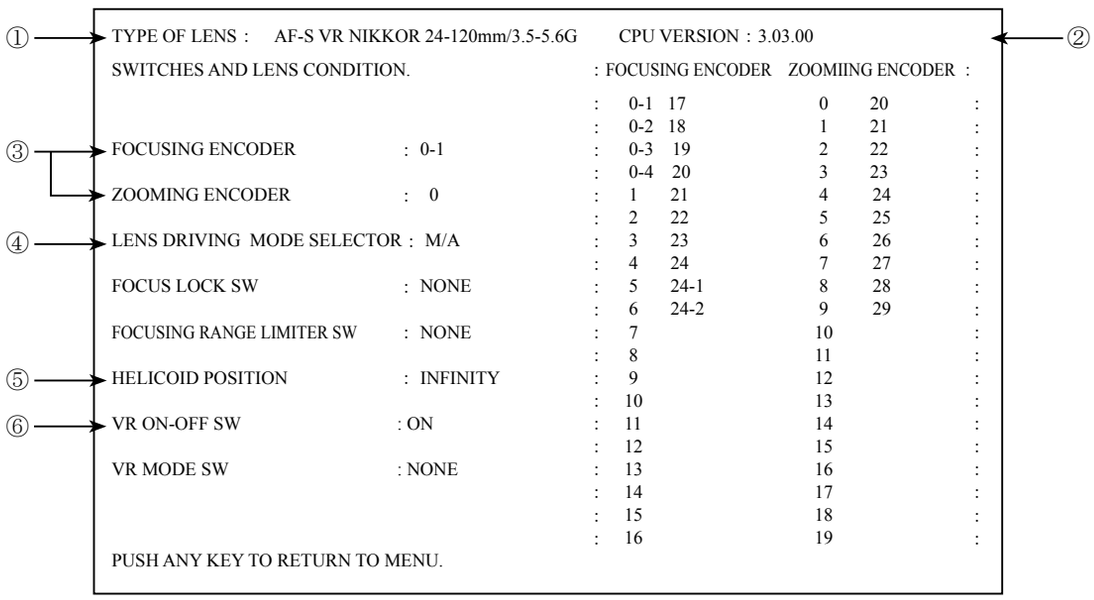


●Oscilloscope setting

V/Div	: 5V
Coupling	: DC
Time/Div	: 20 m Sec
Trigger Mode	: SGL (S)
Trigger Coupling	: DC
Trigger Source	: CH1

※ The waveforms of E and H terminals have the forms for going up for start and going down for start.

（５）Inspection of switches and lens conditions


①
②
③
④
⑤
⑥
TYPE OF LENS : AF-S VR NIKKOR 24-120mm/3.5-5.6G CPU VERSION : 3.03.00
SWITCHES AND LENS CONDITION.
FOCUSING ENCODER : 0-1
ZOOMING ENCODER : 0
LENS DRIVING MODE SELECTOR : M/A
FOCUS LOCK SW : NONE
FOCUSING RANGE LIMITER SW : NONE
HELICOID POSITION : INFINITY
VR ON-OFF SW : ON
VR MODE SW : NONE
PUSH ANY KEY TO RETURN TO MENU.
: FOCUSING ENCODER ZOOMIING ENCODER :
: 0-1 17 0 20 :
: 0-2 18 1 21 :
: 0-3 19 2 22 :
: 0-4 20 3 23 :
: 1 21 4 24 :
: 2 22 5 25 :
: 3 23 6 26 :
: 4 24 7 27 :
: 5 24-1 8 28 :
: 6 24-2 9 29 :
: 7 10 :
: 8 11 :
: 9 12 :
: 10 13 :
: 11 14 :
: 12 15 :
: 13 16 :
: 14 17 :
: 15 18 :
: 16 19 :

① Type of lens.

② The version of CPU in the lens.

③ The signals of the focusing encoder and zooming encoder.

The value changes by turning the MF ring with M or M/A of the lens driving mode selector.

④ The status of Switches

⑤ The helicoid position (close distance, medium distance or infinity) based on the focusing encoder signal.

⑥ The status of VR ON-OFF switch.

REAR COVER RING

Preparation for Inspection & Adjustment of Main PCB

● In case of replacing the main PCB, SWM unit or MR encoder unit, be sure to make the necessary adjustments as follows:

1. Adjustment item
   ・Adjustment for electrical device (MR duty adjustment, drive frequency/motor control adjustment)

2. Equipment and tools to be required
   ・Single output rated voltage power supply: 1 unit (6.0V 3.0A)

   ・Oscilloscope: 1 unit Adjustment for electrical device (MR duty adjustment, drive frequency/motor control adjustment)
   Inspection of lens driving time

   ・AF-I communication box (J15306-1): 1 unit

   ・AF-I communication adapter (J15307): 1 unit

● When the main PCB is replaced, be sure to perform "Writing of EEP-ROM Fixed Values".

AFSZMNEW inspection and adjustment program (J18342)

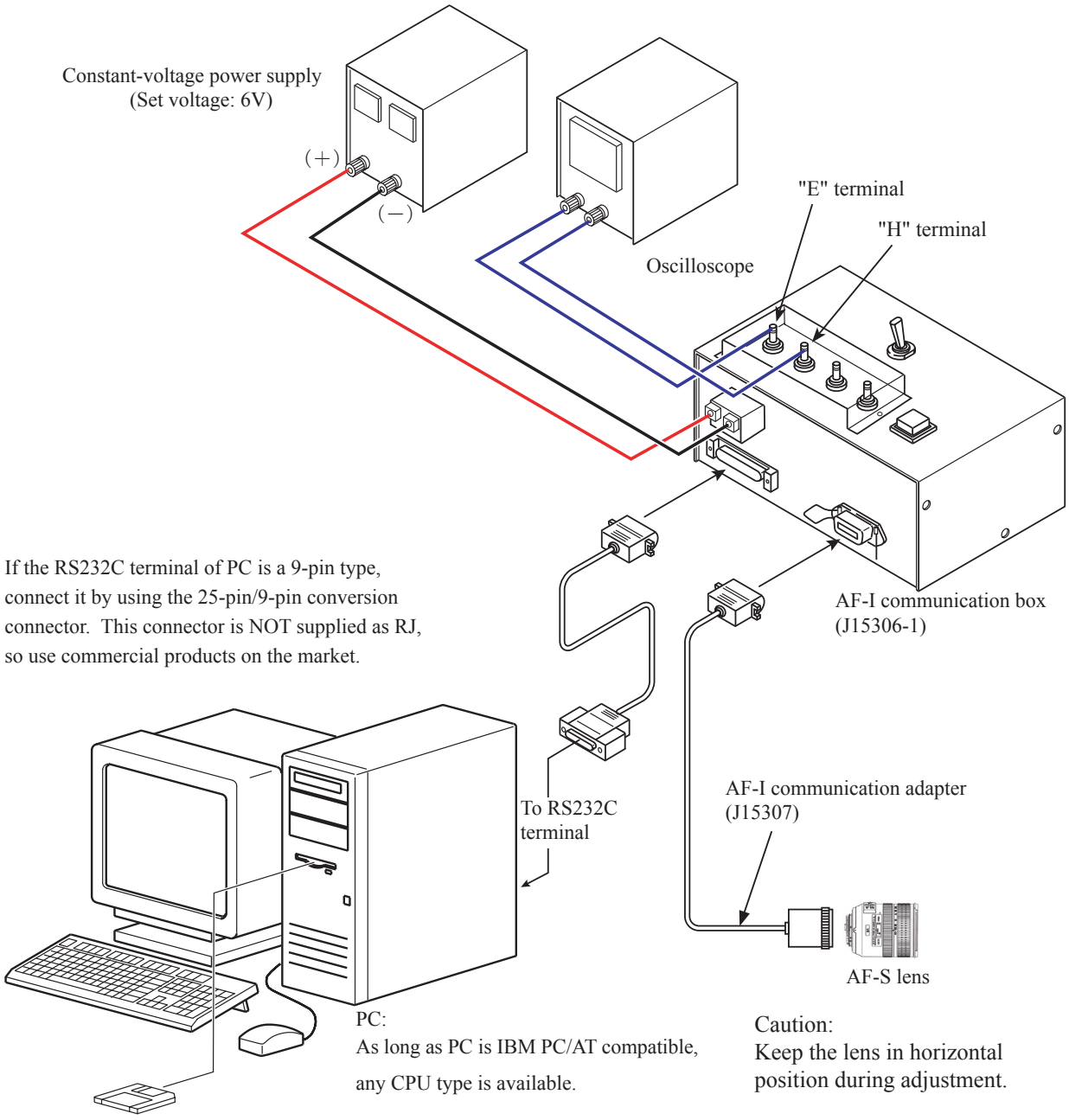
The below hardware requirements are necessary for installing the program on a computer.
Ensure them before installation.

PC	IBM PC/AT compatible
OS	Windows XP Home Edition, Windows XP Professional, Windows 2000
CPU	Pentium Ⅱ 266MHz ～ Pentium Ⅳ 2GHz
RAM (Memory)	32MB or more
HD	6 MB-or-more free space is necessary when installation
Monitor resolution	800×600 or more pixels
Interface	Serial interface ※ USB interface cannot be used.

As long as the above requirements are met, either desktop or notebook PC is available.

サービス計画課 M

【System configuration】

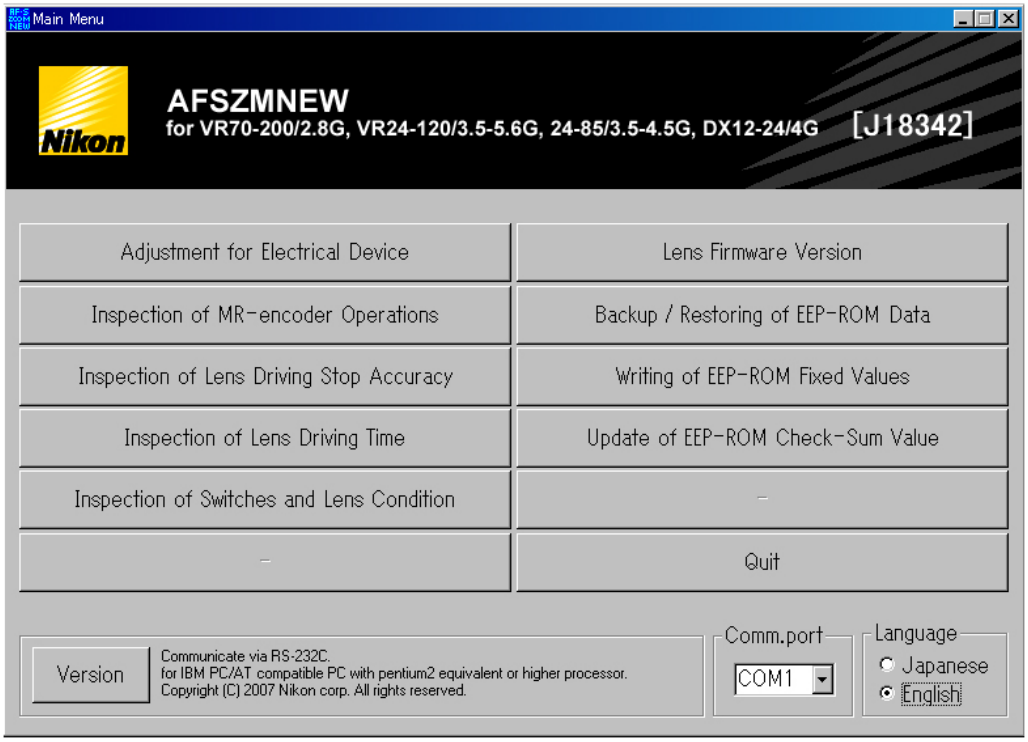

Constant-voltage power supply
(Set voltage: 6V)
(+)
(−)
Oscilloscope
"E" terminal
"H" terminal
AF-I communication box
(J15306-1)
If the RS232C terminal of PC is a 9-pin type, connect it by using the 25-pin/9-pin conversion connector. This connector is NOT supplied as RJ, so use commercial products on the market.
To RS232C terminal
AF-I communication adapter
(J15307)
AF-S lens
PC:
As long as PC is IBM PC/AT compatible, any CPU type is available.
AFSZMNEW Inspection and adjustment software (J18342)

Caution:
Keep the lens in horizontal position during adjustment.

サービス計画課 M

● AF-S Zoom lens (New) inspection program

(1) Menu screen



・Menu items

Items 1. is used for adjustments.

Items from 2. through to 5. are used for inspection

Item 6. is used for confirming firmware

Item from 7. through 9. are used for reading/writing EEPROM DATA.

・Selecting items

Depending on selected items, screens appear such as the lens selection, the focal length selection, the voltage setting, the inspection mode entering, etc.

Follow the instructions on PC.

サービス計画課 M

Adjustment for electrical device

- When the main PCB or SWM unit or MR encoder is replaced, be sure to make adjustments.
- When the main PCB is replaced, be sure to perform "Writing of EEP-ROM Fixed Values".

How to adjust:

① Confirm that the electric current and voltage of the connected constant-voltage power supply are set to set values, and turn the constant-voltage power supply ON.

② Click "Adjustment for Electrical Device" on the menu of AFSMNEW (J18342) inspection program. (Fig. 1)

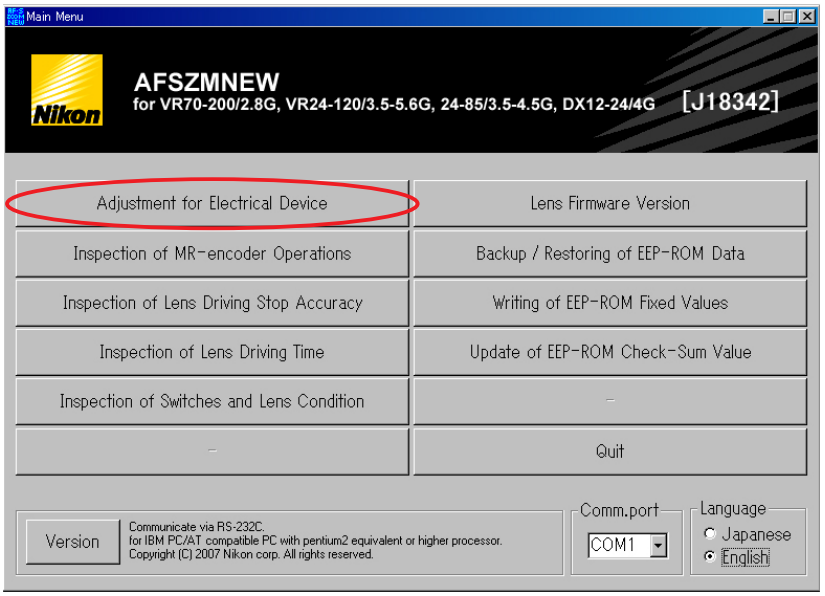


Fig.1

③ The screen for "Writing of EEP-ROM Fixed Values" appears. Click the appropriate item. (Fig.2)

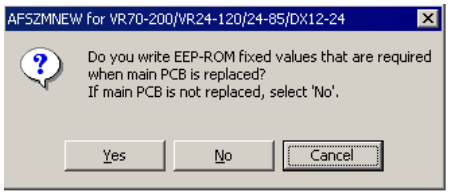

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Do you write EEP-ROM fixed values that are required when main PCB is replaced?
If main PCB is not replaced, select 'No'.
Yes
No
Cancel

Fig.2

④ Following the instructions on the screen, rotate the MF ring in the direction from "Infinity-end" toward "Close-end" slowly by hand. (Fig.3)

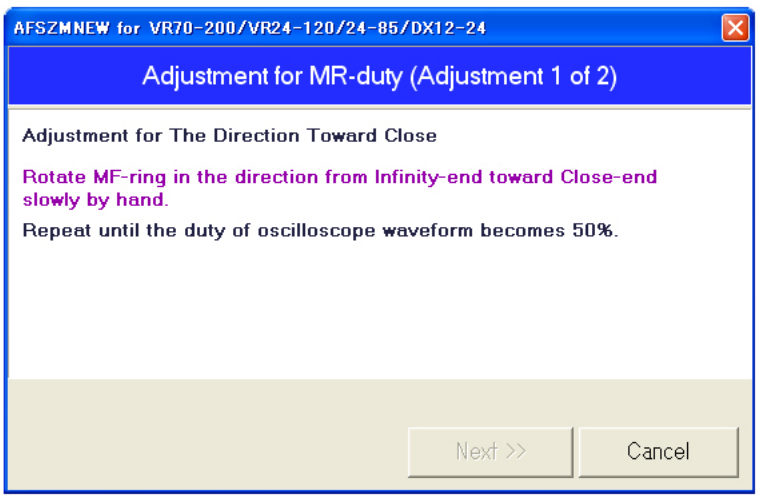
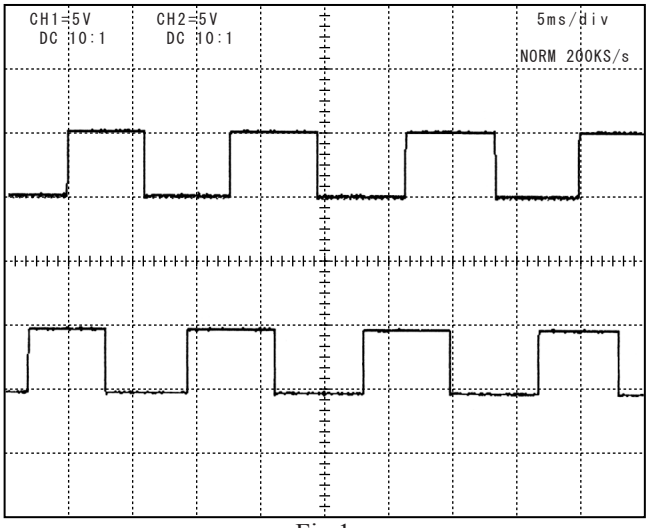

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Adjustment for MR-duty (Adjustment 1 of 2)
Adjustment for The Direction Toward Close
Rotate MF-ring in the direction from Infinity-end toward Close-end slowly by hand.
Repeat until the duty of oscilloscope waveform becomes 50%.
Next >>
Cancel

Fig.3

サービス計画課 M

⑤ Confirm that the waveform on the oscilloscope has duty 50% and stop the MF ring at the close-end. (Fig.1)



● Oscilloscope setting

V/Div (CH1)	: 5V
V/Div (CH2)	: 5V
Coupling	: DC
Time/Div	: 5m Sec
Trigger Mode	: NORMAL
Trigger Coupling	: DC
Trigger Source	: CH 1
Trigger Position	: + 4 div
Trigger Type	: EDGE
Trigger Level	: 2.5 V

Fig.1

⑥ Following the instruction on the screen, rotate the MF ring in the direction from "Close-end" to "Infinity-end" slowly by hand.

Confirm that the waveform on the oscilloscope has duty 50% and stop the MF ring at "Infinity-end. (Fig.2)

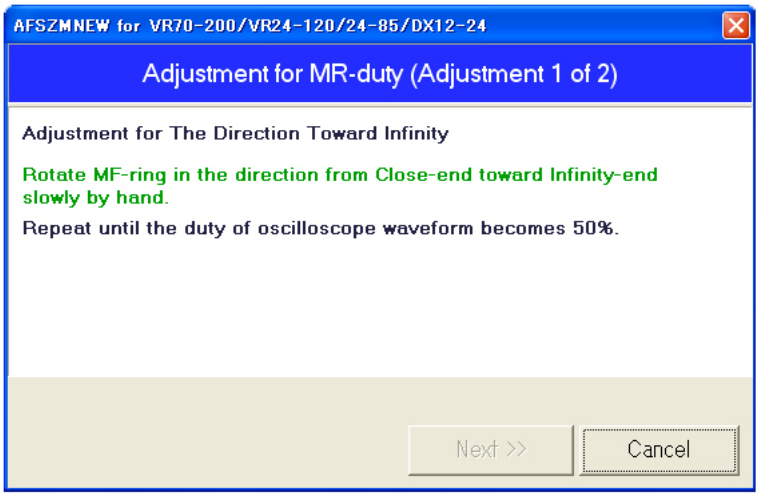

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Adjustment for MR-duty (Adjustment 1 of 2)
Adjustment for The Direction Toward Infinity
Rotate MF-ring in the direction from Close-end toward Infinity-end slowly by hand.
Repeat until the duty of oscilloscope waveform becomes 50%.
Next >>
Cancel

Fig.2

⑦ When the adjustment is completed, click "Next". (Fig.3)

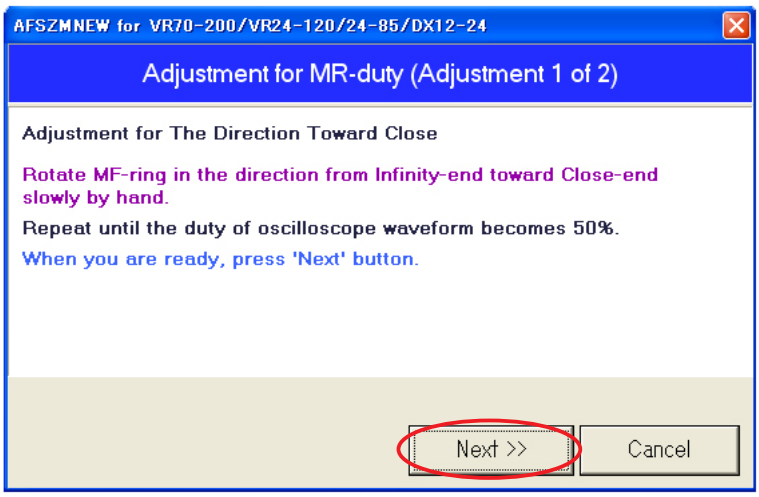
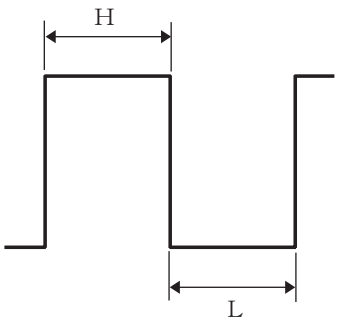

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Adjustment for MR-duty (Adjustment 1 of 2)
Adjustment for The Direction Toward Close
Rotate MF-ring in the direction from Infinity-end toward Close-end slowly by hand.
Repeat until the duty of oscilloscope waveform becomes 50%.
When you are ready, press 'Next' button.
Next >>
Cancel

Fig.3

サービス計画課 M

Caution:
If each waveform from "Infinity-end" to "Close-end", or "Close-end" to "Infinity-end" does not have duty 50%, perform "Inspection and adjustment of the MR encoder output waveform" on Page L15-L17 for readjustment.

Standard H:L = 100 : 206 ～ 206 : 100 (50% ±17.3%)



Drive frequency/motor control adjustments

Automatic adjustment

● When the main PCB or SWM unit or MR encoder is replaced, be sure to make adjustments.
① Complete the same procedure of the adjustment for electrical device, and click "Next". (Fig.1). The lens starts scan-driving automatically. (Fig.2)

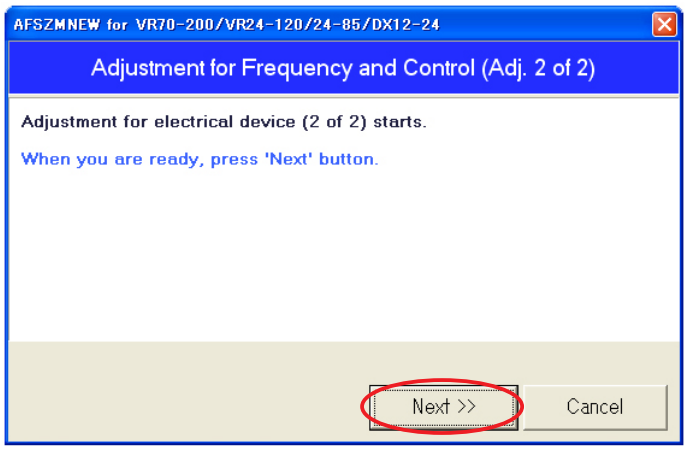

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Adjustment for Frequency and Control (Adj. 2 of 2)
Adjustment for electrical device (2 of 2) starts.
When you are ready, press 'Next' button.
Next >>
Cancel

Fig.1

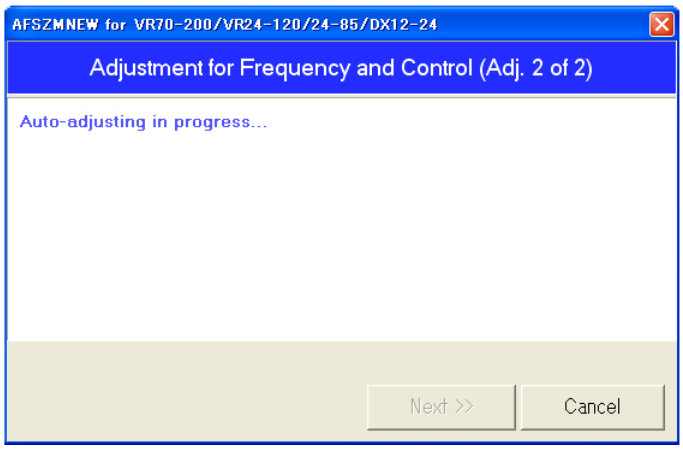


Fig.2

サービス計画課 M

② When "Fig.1" screen appears, if the motor driving stands still, click "Close" to end the adjustment.

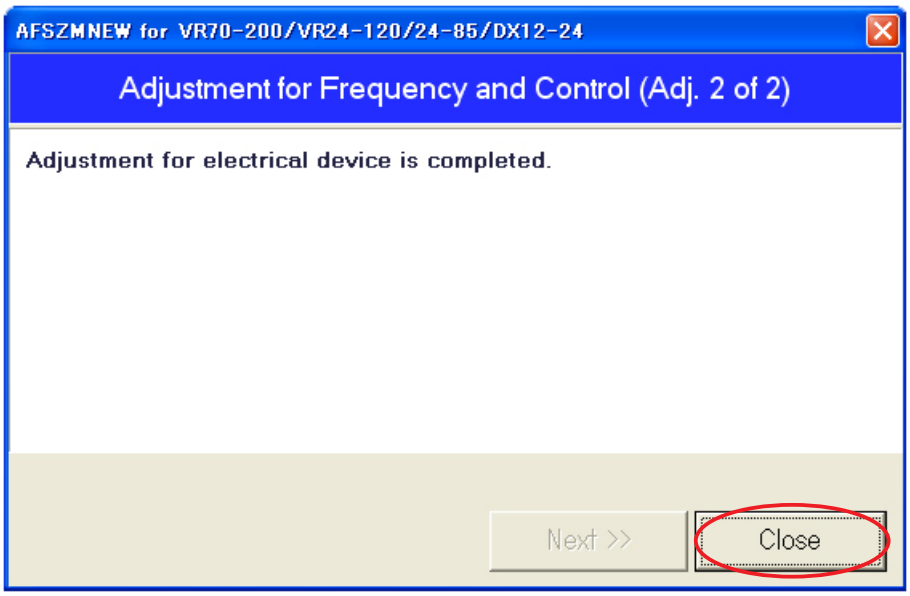

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Adjustment for Frequency and Control (Adj. 2 of 2)
Adjustment for electrical device is completed.
Next >>
Close

Fig.1

Manual adjustment

① If the automatic adjustment failed, "Adjustment could not be completed" (Fig.1) will appear. So click "Yes" and make the manual adjustment.

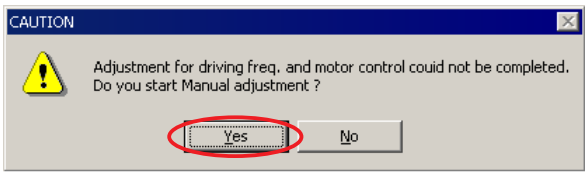


Fig.1

② Low-speed adjustment

1. Set the oscilloscope to the set values of "Fig.2", and make the low-speed adjustment of lens.
2. Click each adjustment of "A section" in "Fig.3", and adjust so that the values become within standards.
3. When the low-speed adjustment is completed, click "Next" of "Fig.3".

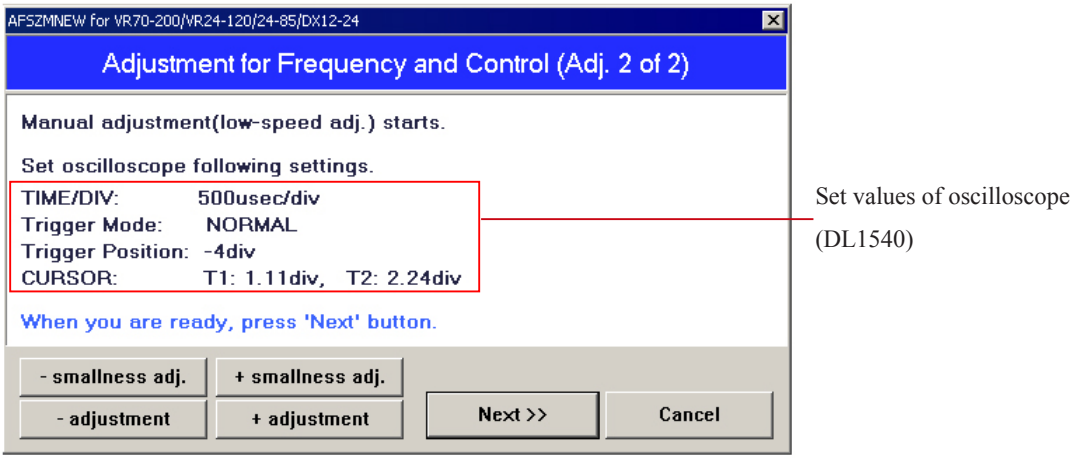


Fig.2

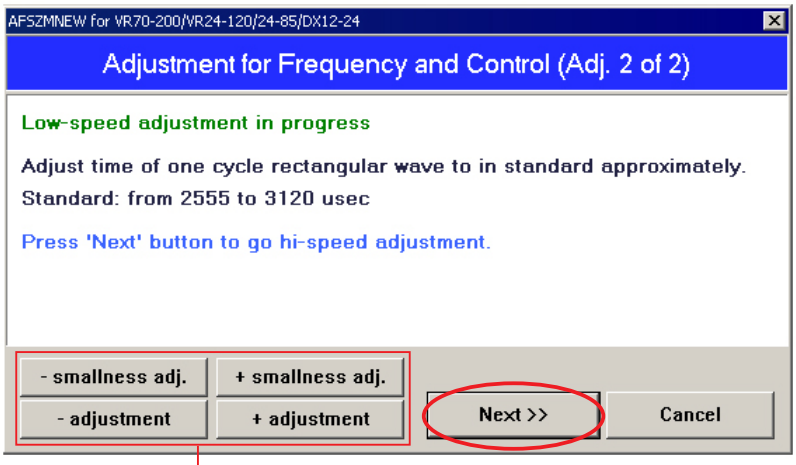

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Adjustment for Frequency and Control (Adj. 2 of 2)
Low-speed adjustment in progress
Adjust time of one cycle rectangular wave to in standard approximately.
Standard: from 2555 to 3120 usec
Press 'Next' button to go hi-speed adjustment.
- smallness adj.
+ smallness adj.
- adjustment
+ adjustment
Next >>
Cancel
A section

Fig.3

③ High-speed adjustment

Make the high-speed adjustment of "Fig.4" by the same procedure as in the low-speed adjustment.
(Be careful, however, that the setting values are different.)

・When the adjustment is completed, click "Write adj.value" of "Fig.5".

If even the manual adjustment cannot be made, the SWM unit or MR head may be defective.

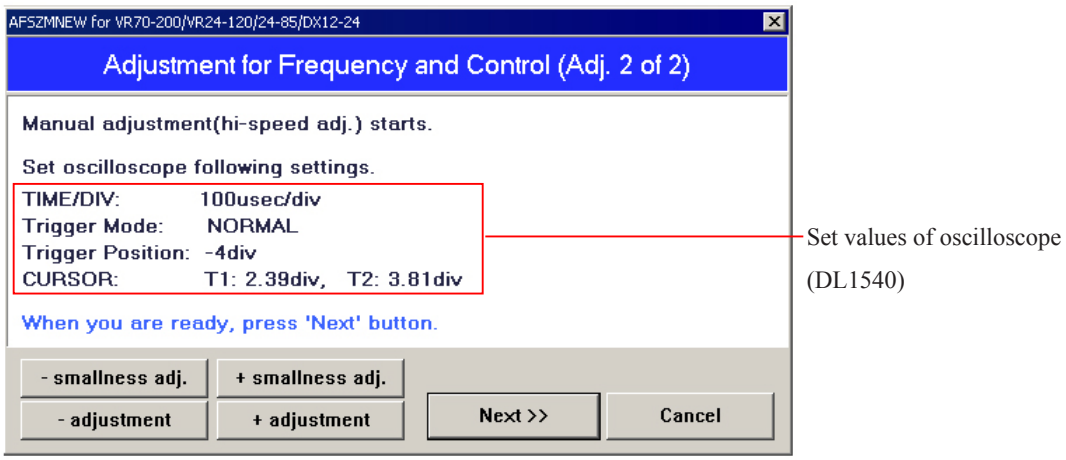


Fig.4

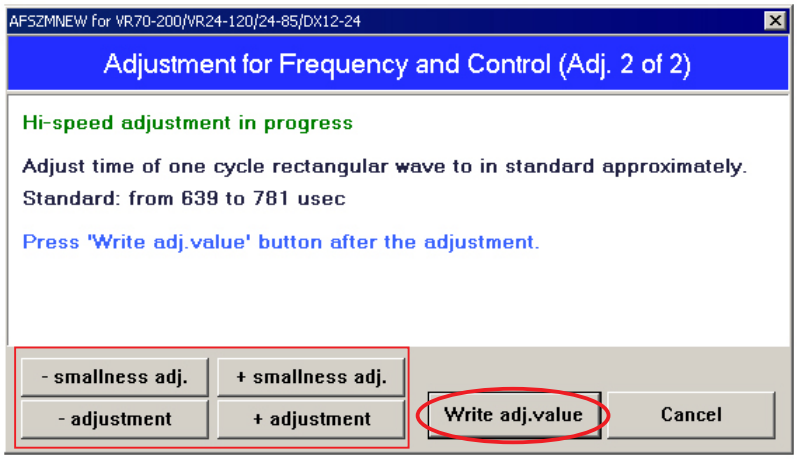

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Adjustment for Frequency and Control (Adj. 2 of 2)
Hi-speed adjustment in progress
Adjust time of one cycle rectangular wave to in standard approximately.
Standard: from 639 to 781 usec
Press 'Write adj.value' button after the adjustment.
- smallness adj.
+ smallness adj.
- adjustment
+ adjustment
Write adj.value
Cancel

Fig.5

(2) Screen for inspecting MR encoder operation

① Click "Start insp." of "Fig.1".

Caution:
When the MR ring is roated during the lens-scan driving, the number of pulses shows an abnormal value.
So do NOT touch the MF ring in operation.

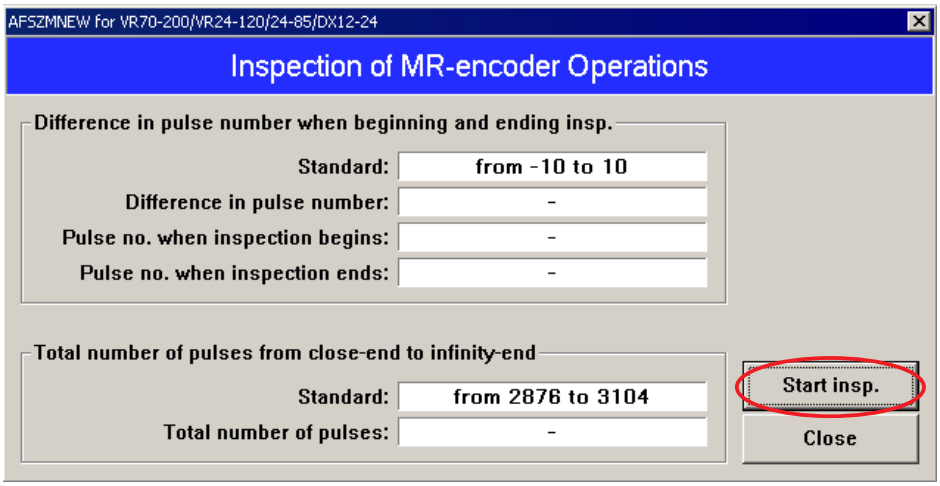


Fig.1

② When the operation check is completed, the result is displayed as shown in "Fig.2".
If there is no problem with the result, click "Close".
If there is some problem, make the readjustment by referring to Page L36-16.

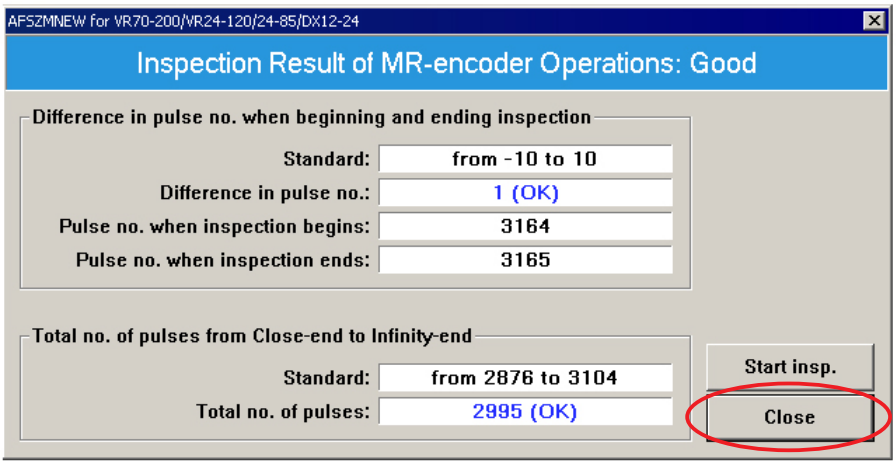


Fig.2

The difference in pulse no. when inspecting must be within standards.

Standard of "Difference in pulse no." : 0±10 PULSE(S)

Standard of "Total no. of pulses": 2990±114 PULSE(S)

サービス計画課 M

(3) Inspection screen of lens driving stop accuracy

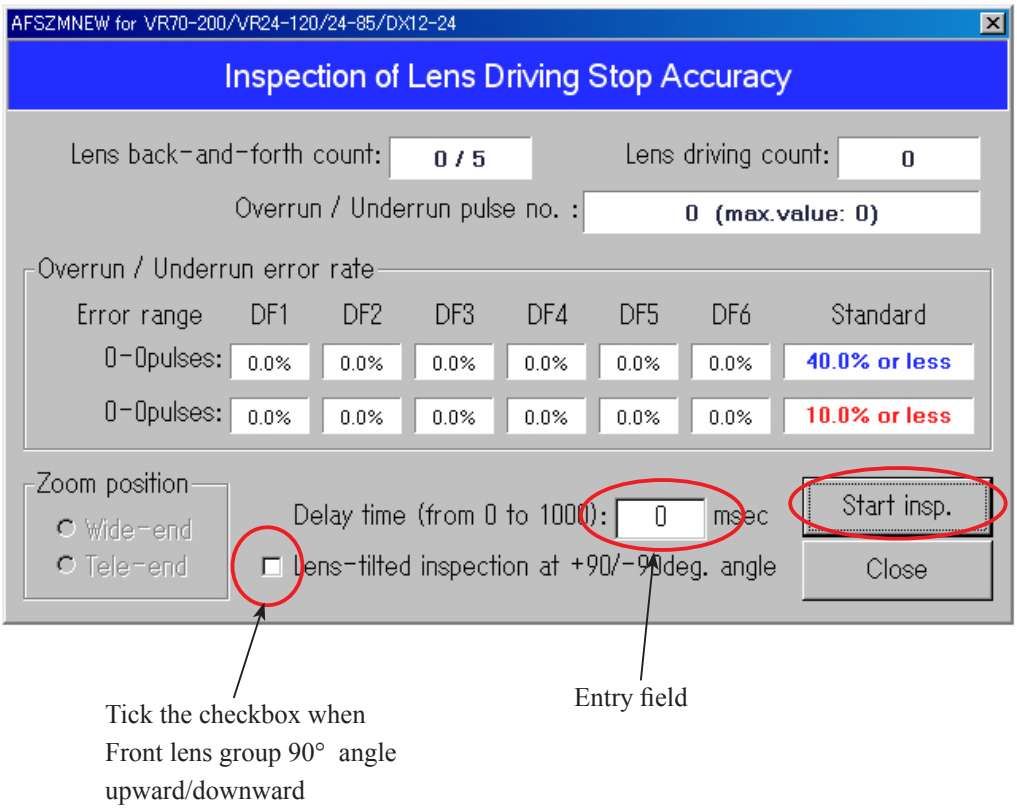
① Make this inspection on both focal length 24mm (W) and 120mm (T) at the following five lens positions.

(Lens position when inspecting)

Tilt of Lens	Position of index window
Horizontal	Up / Right / Left
Front lens group 90° angle upward	
Front lens group 90° angle downward	

① Click "Start insp.". The inspection of lens driving stop accuracy starts.
② If the lens stops during the inspection, input a figure [from "0" to "1000" (msec: millisecond) to delay the process] which prevents stopping the lens, into the below "Delay time" entry field.

Note:
The delay time is the setting value set by the adjustment software. So, if the lens does not stop during "Inspection of Lens Driving Stop Accuracy" in the end, any value can be input without problem. However, the larger the value of "ADJUST DELAY-TIME" gets, the longer the inspection time becomes.


AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Inspection of Lens Driving Stop Accuracy
Lens back-and-forth count: 0 / 5
Lens driving count: 0
Overrun / Underrun pulse no. : 0 (max.value: 0)
Overrun / Underrun error rate
Error range DF1 DF2 DF3 DF4 DF5 DF6 Standard
0-0pulses: 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 40.0% or less
0-0pulses: 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 10.0% or less
Zoom position
Wide-end
Tele-end
Delay time (from 0 to 1000): 0 msec
Lens-tilted inspection at +90/-90deg. angle
Start insp.
Close
Tick the checkbox when Front lens group 90° angle upward/downward
Entry field

③ During the lens driving, the screen of "Fig.1" appears.

Caution:
When the MR ring is roated during the lens-scan driving, the number of pulses shows an abnormal value.
So do NOT touch the MF ring in operation.

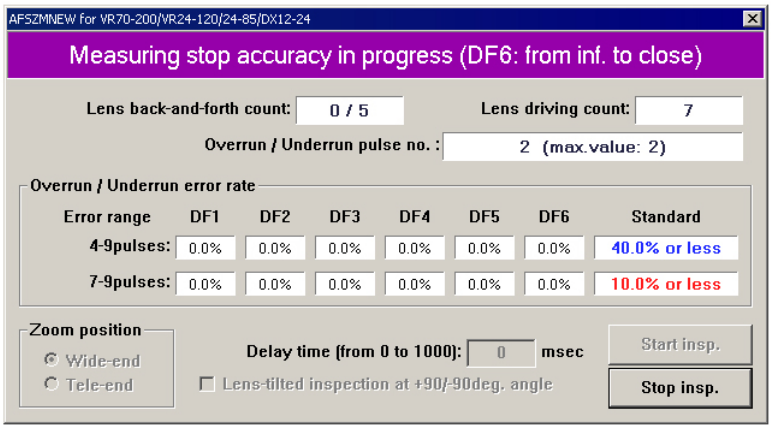

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Measuring stop accuracy in progress (DF6: from inf. to close)
Lens back-and-forth count: 0 / 5
Lens driving count: 7
Overrun / Underrun pulse no. : 2 (max.value: 2)
Overrun / Underrun error rate
Error range DF1 DF2 DF3 DF4 DF5 DF6 Standard
4-9pulses: 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 40.0% or less
7-9pulses: 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 10.0% or less
Zoom position
Wide-end
Tele-end
Delay time (from 0 to 1000): 0 msec
Lens-tilted inspection at +90/-90deg. angle
Start insp.
Stop insp.

Fig.1

④ The number of overrun/underrun pulses must be within the standards after the lens back-and forth driving-motion five times ("5/5TIME (S)." in ① of Fig.2).

Standard	Df1~Df6: 40% or less (4 - 9 pulse occurrence ratio)	② of "Fig.2"
	Df1~Df6: 10% or less (7-9 pulse occurrence ratio)	③ of "Fig.2"
	10-or-more pulse occurrence: 0 for DF1 ～ Df6 (Even only one occurrence is judged as defective.)	④ of "Fig.2"

※ "Df1~Df6" shows the lens driving amount.

⑤ When the operation check is completed, the result is displayed as shown in "Fig.2".
If there is no problem with the result, click "Close".
If there is some problem, make the readjustment by referring to Page L36-16.

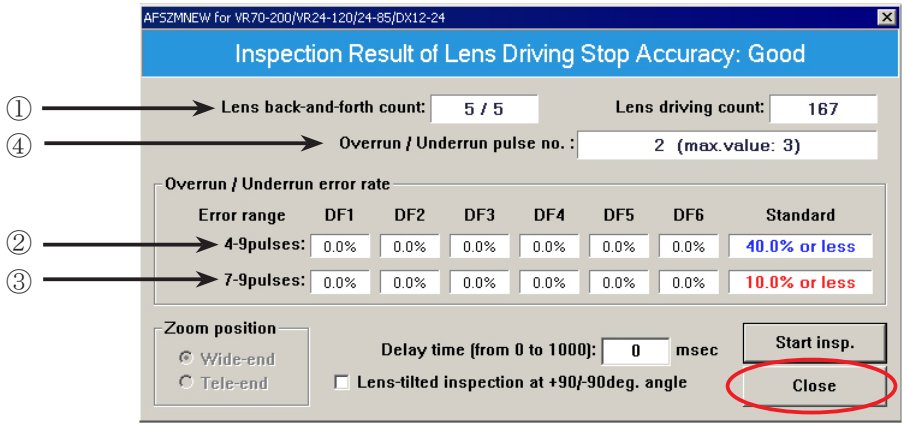

AFSZMNEW for VR70-200/VR24-120/24-85/DX12-24
Inspection Result of Lens Driving Stop Accuracy: Good
①
Lens back-and-forth count: 5 / 5
Lens driving count: 167
④
Overrun / Underrun pulse no. : 2 (max.value: 3)
Overrun / Underrun error rate
Error range DF1 DF2 DF3 DF4 DF5 DF6 Standard
②
4-9pulses: 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 40.0% or less
③
7-9pulses: 0.0% 0.0% 0.0% 0.0% 0.0% 0.0% 10.0% or less
Zoom position
Wide-end
Tele-end
Delay time (from 0 to 1000): 0 msec
Lens-tilted inspection at +90/-90deg. angle
Start insp.
Close

Fig.2

サービス計画課 M

(4) Inspection screen of lens driving time

① Make the inspection on both focal length 24mm (W) and 120mm (T) at the five lens positions of "Fig.1".

② Select each driving amount. Confirm that each lens driving time is within the standard. (Fig.2)

③ If the inspection result is within standard, click "Close" to end. If any of each driving amount becomes out of standard, make the readjustment by referring to Page L36-16.

Caution: When the MR ring is roated during the inspection, the waveform shows an abnormal value. So do NOT touch the MF ring during the inspection.

(Lens position when inspecting)

Tilt of Lens	Position of index window
Horizontal	Up / Right / Left
Front lens group 90° angle upward	
Front lens group 90° angle downward	

Fig.1

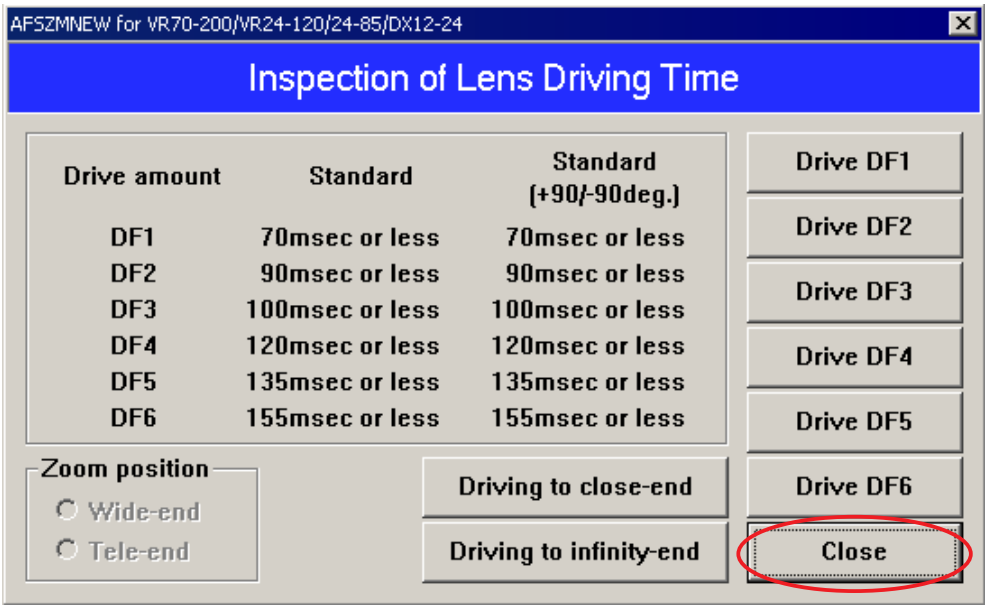
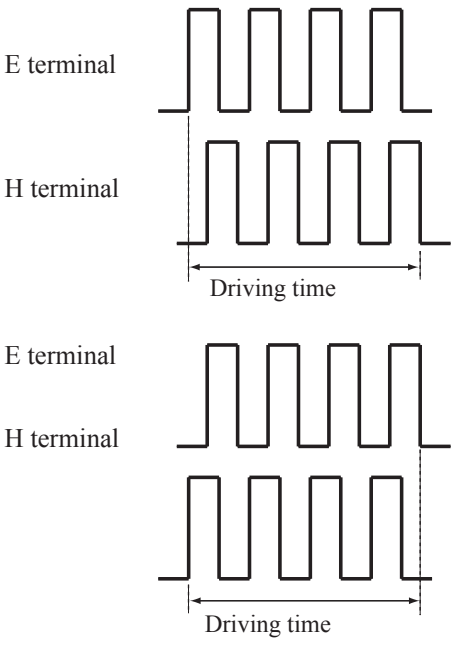


Fig.2



●Oscilloscope setting

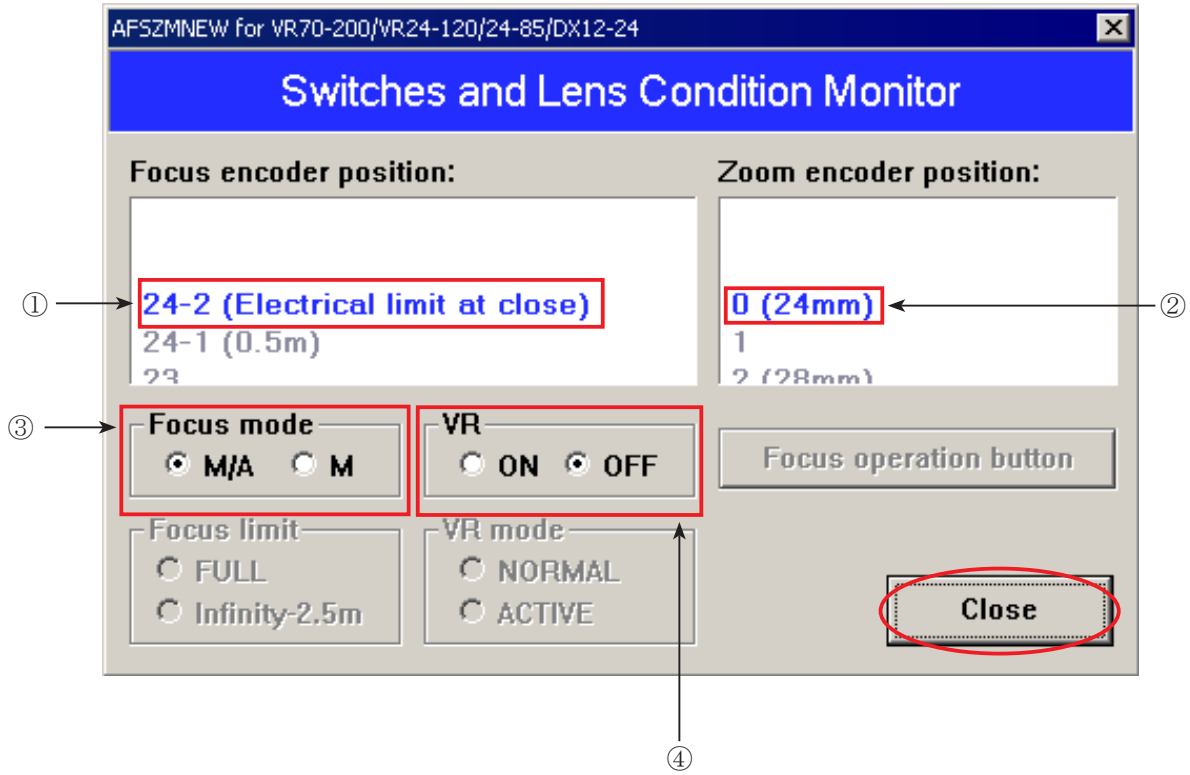
V/Div	: 5V
Coupling	: DC
Time/Div	: 20 m Sec
Trigger Mode	: SGL (S)
Trigger Coupling	: DC
Trigger Source	: CH1

※ There are two types in shape of waveforms of E and H terminals: Waveform (1) starts and goes up (2) starts and goes down.

サービス計画課 M

(5) Inspection screen of switches and lens conditions

・If there is no problem with each item, click "Close" to end. If there is some problem, make the readjustment by referring to Page L36-16.



① Focus encoder signal

② Zoom encoder signal

③ Status of focus mode

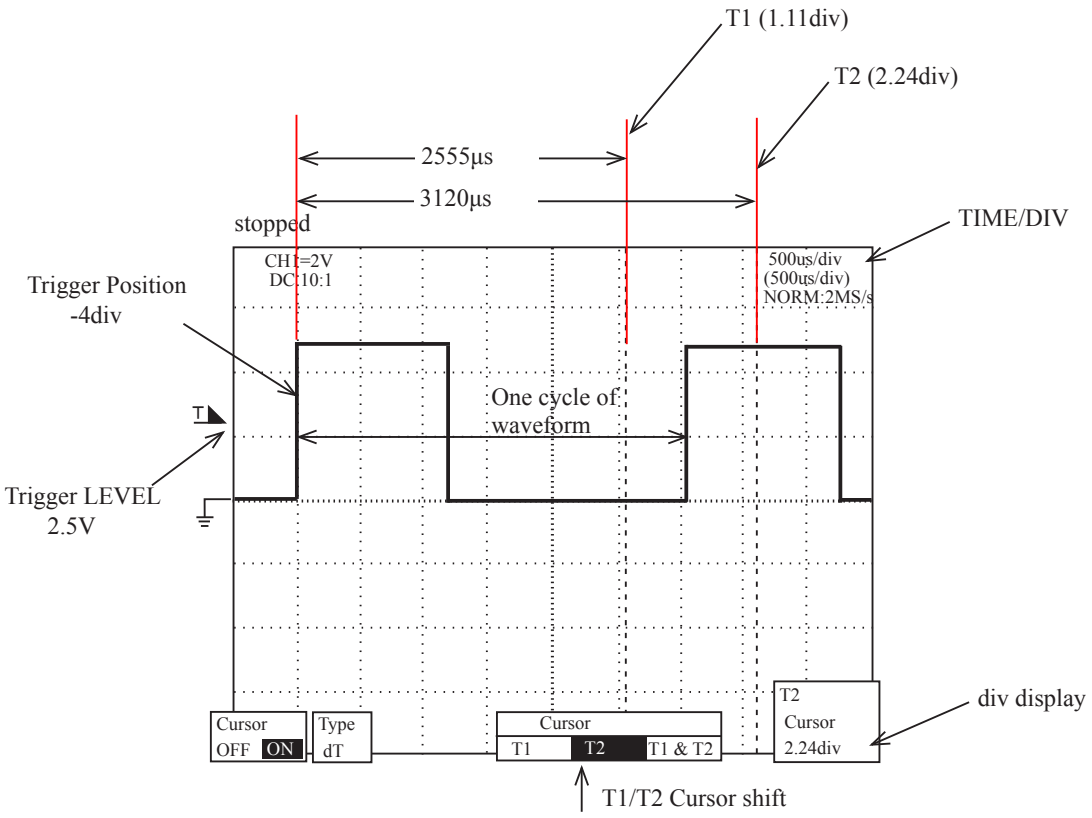
④ Status of VR (vibration reduction) ON-OFF switch

Rear cover ring

サービス計画課 M

Oscilloscope: Example of settings for DL1540

- "Fig.2" on Page L36-8 shows setting values for low-speed adjustment, while "Fig.4" on Page L36-9 shows those for high-speed adjustment.
- Setting T1 (min. value) and T2 (max. value) of one cycle of waveform beforehand, as shown by the below dotted lines, facilitates the adjustment.
- Because TIME/DIV, T1, T2, and other setting values are different between the low-speed adjustment and high-speed adjustment, check the values by referring to "Fig.2" on Page L36-8 and "Fig.4" on Page 36-9.



Inspection of Lens operations

Check the lens operations by using PC after assembling.

○ Check by PC

● Inspection item

1. MR encoder operations

・Activate the scanning drive of lens and check the difference in pulse no. when beginning and ending inspection.

・In case the MR head of the MR encoder and the magnetic tape are misaligned, the difference becomes larger.

2. Lens drive stop accuracy

・Check the number of overrun/underrun pulses (deviation of the stop position from the target position) per the specified lens drive amount.

・If there is no variation in mechanical operations of the focus ring driving section, the underrun tends to occur when the cam ring rotation of the MR encoder is heavy, while the overrun tends to occur when the cam ring rotation is light.

3. Lens driving time

・Check the driving time (from starting and stopping the driving) of the specified lens by using the oscilloscope.

・If there is no variation in mechanical operations of the focus ring driving section, the driving time tends to be longer when the cam ring rotation of the MR encoder is heavy, while the driving time tends to be shorter when the cam ring rotation is light.

4. Switches and lenses

・Check the ON/OFF operations of switches and the operating condition of the focus encoder and zoom encoder.

●After inspections

1. When the MR encoder operations are not up to the standard:

Make the readjustment of the electrical device. (ref. Page L36-4 ～ L36-6)

In case the pulse is not up to the standard, readjust the output waveform of the MR encoder. (ref. Page L15)

In case the pulse meets the standard, replace the cam ring unit.

2. When the lens-servo stop accuracy is not up to the standard:

Check the output waveform of the MR encoder. If it is normal, replace the cam ring unit.

3. When the lens driving time is not up to the standard:

Readjust the driving frequency and motor control.

In case the lens driving time is not up to the standard even after the readjustment, replace the cam ring unit.

4. When switches do not work properly:

Check the wiring state of the troubled switch or replace it.

サービス計画課 M

VR ADJUSTMENT

When performing the VR adjustment, please refer to the [Instruction Manual] attached to the VR lens adjustment equipment (J15380).

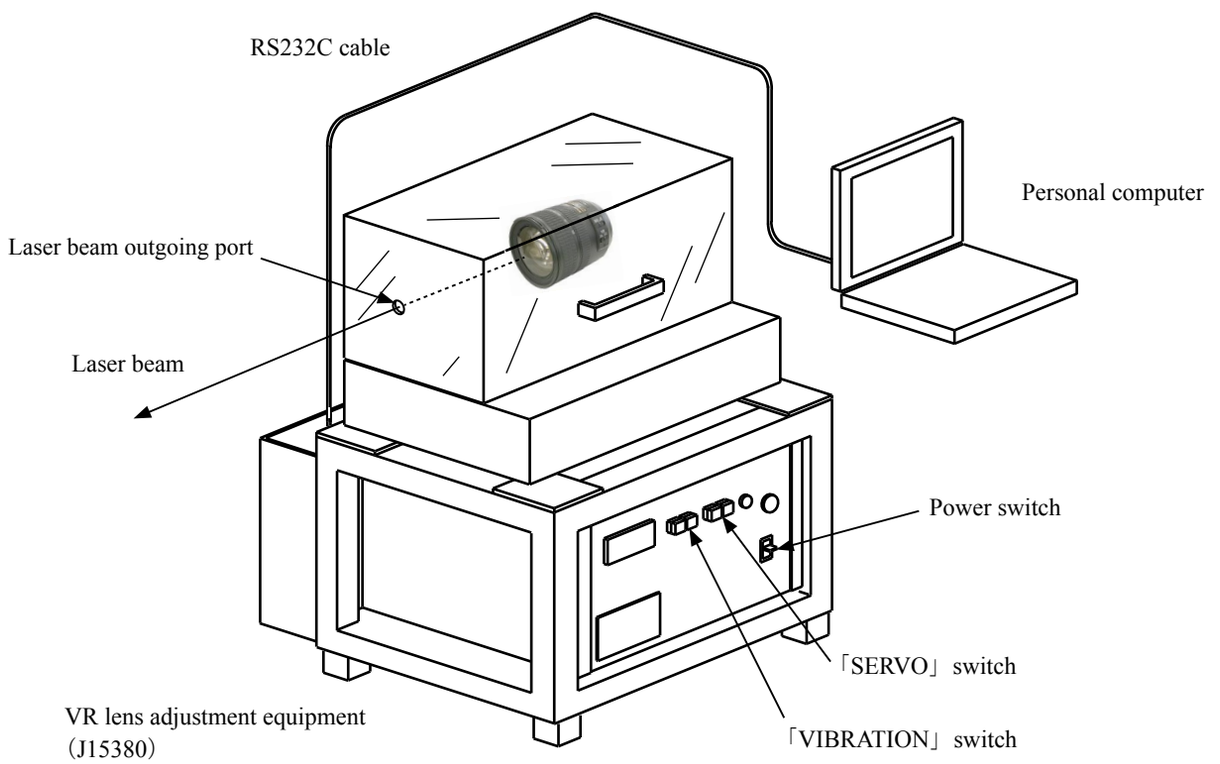
⚠ WARNING
●This equipment uses the laser beam. Do not look into the laser beam directory.

Preparation for the VR adjustment

① Set up the VR lens adjustment equipment (J15380) as shown in Figure below.

② Connect the personal computer to the equipment and run the personal computer.

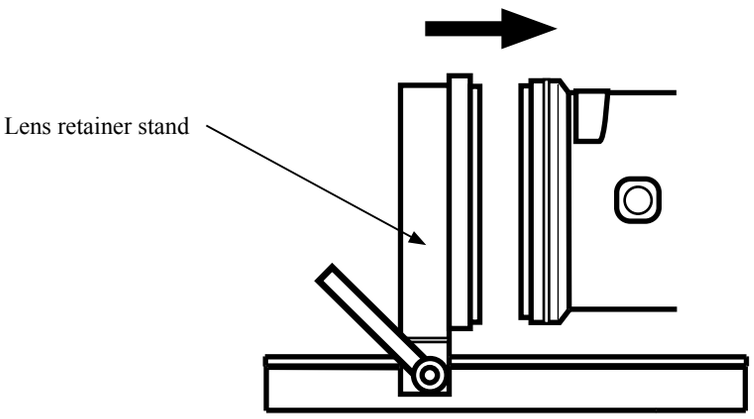
③ Mount the lens on the equipment. Set the focus ring to the infinity position and the zoom ring to TELE side. Please refer to the next page for the procedure to mount the lens.



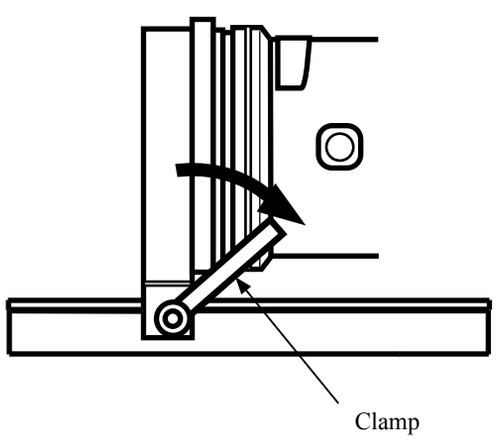
Notes: The distance from the laser beam outgoing port to the radiation face should be about 5m apart.
Do not intercept the optical path of the laser beam.

Procedure to mount the lens

1． Attach the lens to the equipment and move the lens retainer stand in the direction of the arrow.

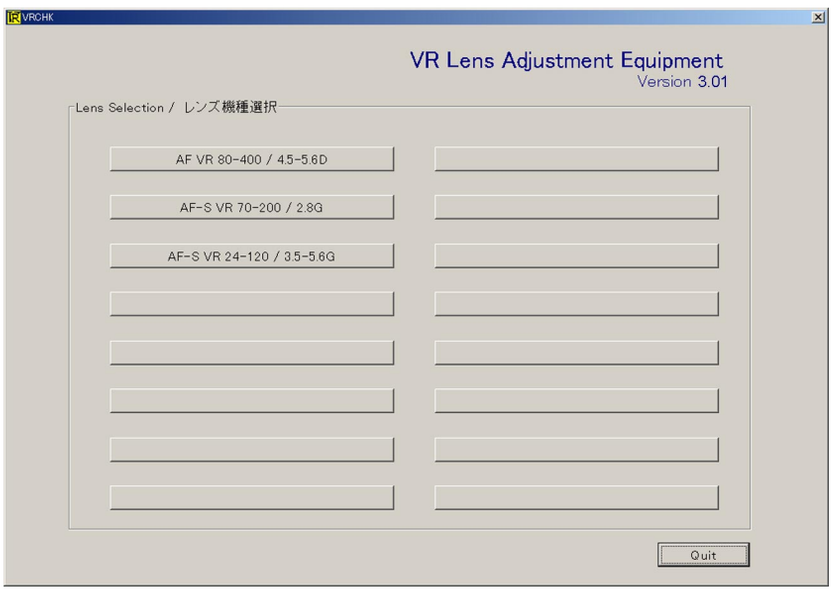


2． Move the lens retainer stand to the position shown in Figure below and fix it by tightening the clamp.



④ Turn on the VR lens adjustment equipment (J15380) and run the adjustment software.

⑤ Move the cursor to [AF-S VR 70-200/2.8G] in the Lens Selection window and click it.



※ If the below mesage appears, set the zoom ring again by referring to the pre-page [Procedure to mount the lens] and click the [OK] button.
The focus ring is automatically set.

Notes : Do not change the lens settings (zoom ring) until the adjustment is finished and it goes back to the Lens Selection window.

If the setting position changes in the middle of the adjustment, the correct adjustment value cannot be obtained

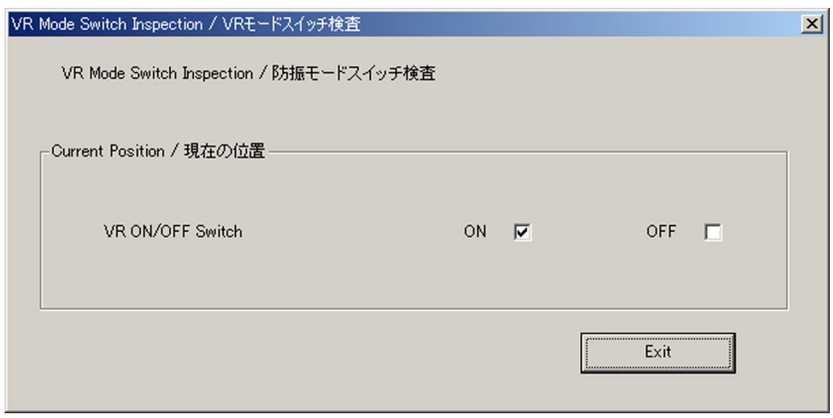
VIBRATION REDUCTION MODE SW INSPECTION

① Move the cursor to a box in front of the [VR Mode Switch Inspection] and click to mark the check marking.

② Move the cursor to the Execute button and click it.

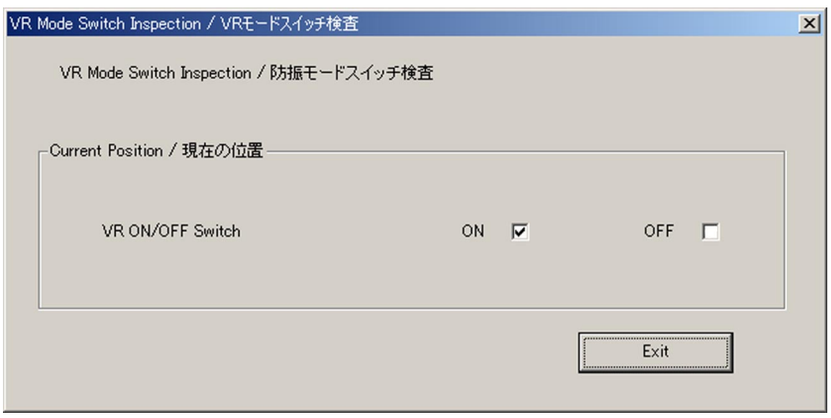
Adjustment Items / 調整項目
Adjustment Items / 調整項目
Lens Model
AF-S VR 24-120 / 3.5-5.6G
MPU Version
03.03.00
EEPROM Initial Values Rewriting / EEPROM初期値書き込み
Omitting Adjusted Values / 調整値を除く
All (Except KF) / 全て(但しKFを除く)
EEPROM Data Display and Rewriting / EEPROMデータ表示及び書き換え
EEPROM Checksum Rewriting / EEPROMチェックサム書き換え
VR Mode Switch Inspection / 防振モードスイッチ検査
VR Lens Position Adjustment / VRレンズ位置調整
VR Gyro Adjustment / 防振ジャイロ調整
Parameter Change / パラメータ変更
Execute / 実行
Quit

③ VR Mode Switch Inspection window is shown.



④ The position of VR mode switch is indicated.

By turning the VR mode switch, the current position is shown in the real time.



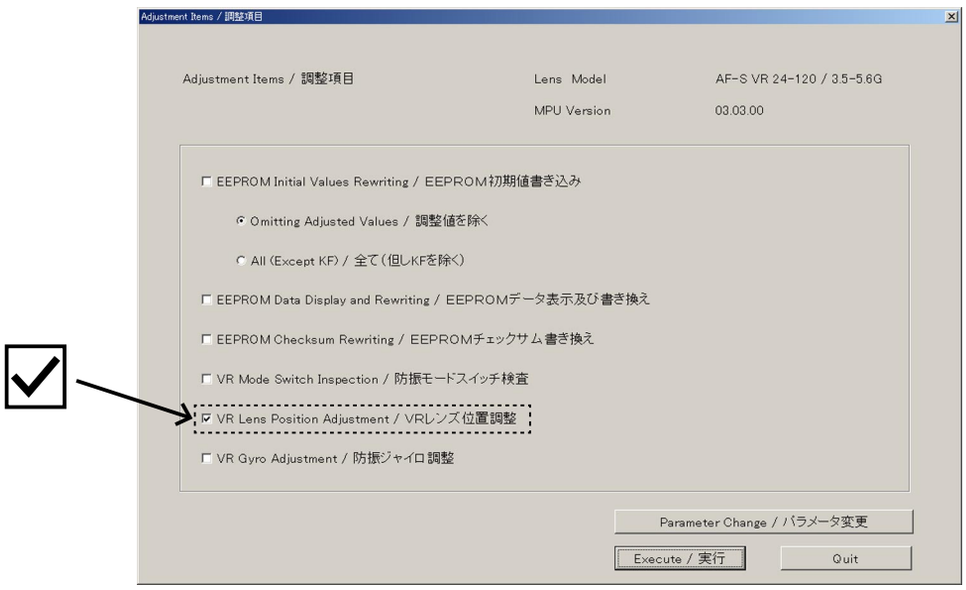
VR mode switch

⑤ When finishing the VR mode switch, move the cursor to the [Exit] button and click it to evacuate from the inspection window.

VR LENS POSITION ADJUSTMENT

① Move the cursor to a box in front of the [VR Lens Position Adjustment] and click it to mark the check marking.

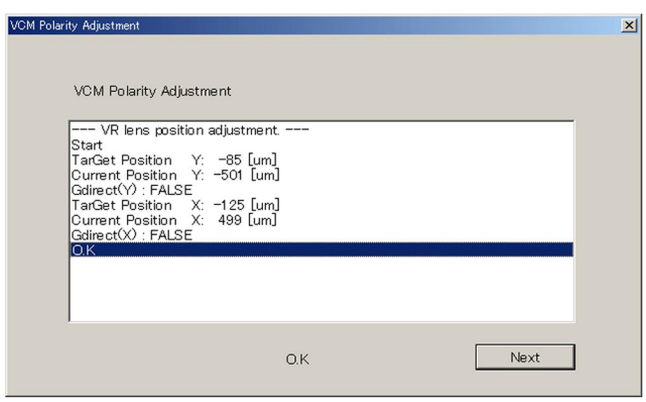
② Move the cursor to the Execute button and click it.


Adjustment Items / 調整項目
Adjustment Items / 調整項目
Lens Model
AF-S VR 24-120 / 3.5-5.6G
MPU Version
03.03.00
EEPROM Initial Values Rewriting / EEPROM初期値書き込み
Omitting Adjusted Values / 調整値を除く
All (Except KF) / 全て(但しKFを除く)
EEPROM Data Display and Rewriting / EEPROMデータ表示及び書き換え
EEPROM Checksum Rewriting / EEPROMチェックサム書き換え
VR Mode Switch Inspection / 防振モードスイッチ検査
VR Lens Position Adjustment / VRレンズ位置調整
VR Gyro Adjustment / 防振ジャイロ調整
Parameter Change / パラメータ変更
Execute / 実行
Quit

③ The message like a picture on the left is shown. Set the VR mode switch of the lens to ON (Full or Release), and then move the cursor to the OK button and click it.

・VCM Polarity Adjustment (Controlled automatically)

Detect the polarity of the VCM (Voice Coil Motor) and write it in EEPROM as the compensation value.
In-between times, the message to confirm the lens position of angle (0 or 90degrees) appears.
So, set the lens to the position and click the [OK] button.



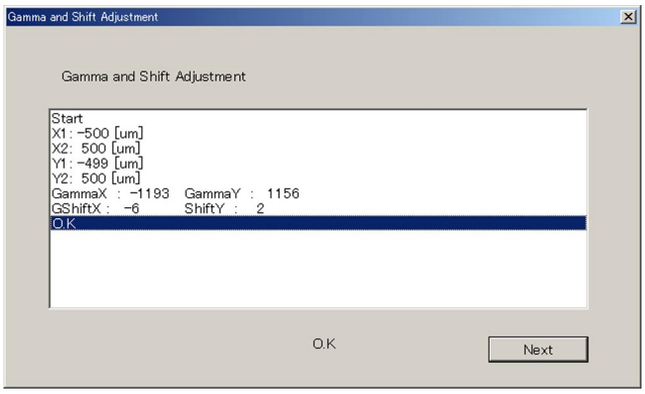
When [OK] is shown on the window, move the cursor to the Next button and click it.

・**Gamma and Shift Adjustment (Controlled automatically)**

Adjust the inclination and control center position on the basis of the position sensor output in the VR unit.

In-between times, the message to confirm the lens position of angle (0 or 90degrees) appears.

So, set the lens to the position and click the [OK] button.



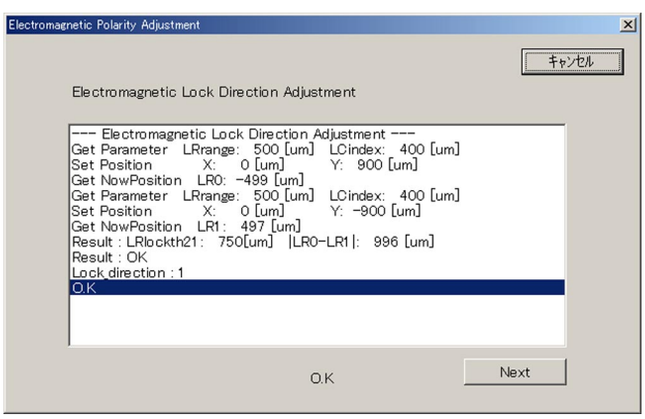
When [OK] is shown on the window, move the cursor to the Next button and click it.

・**Electromagnetic Lock Center Position Adjustment (Controlled automatically)**

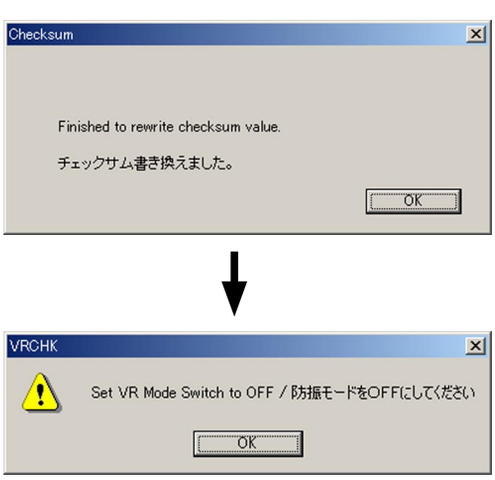
Adjust the electromagnetic lock center position.

In-between times, the message to confirm the lens position of angle (0 or 90degrees) appears.

So, set the lens to the position and click the [OK] button.


Electromagnetic Polarity Adjustment
キャンセル
Electromagnetic Lock Direction Adjustment
--- Electromagnetic Lock Direction Adjustment ---
Get Parameter LRrange: 500 [um] LCindex: 400 [um]
Set Position X: 0 [um] Y: 900 [um]
Get NowPosition LR0: -499 [um]
Get Parameter LRrange: 500 [um] LCindex: 400 [um]
Set Position X: 0 [um] Y: -900 [um]
Get NowPosition LR1 : 497 [um]
Result : LRlockth21 : 750[um] |LR0-LR1| : 996 [um]
Result : OK
Lock direction : 1
O.K
O.K
Next

When [OK] is shown on the window, move the cursor to the Next button and click it.



・When the message that says rewriting the checksum is finished is shown, click the [OK] button.

Then set the VR mode to OFF according to the message and click the OK button to evacuate from the adjustment window.

Notes :

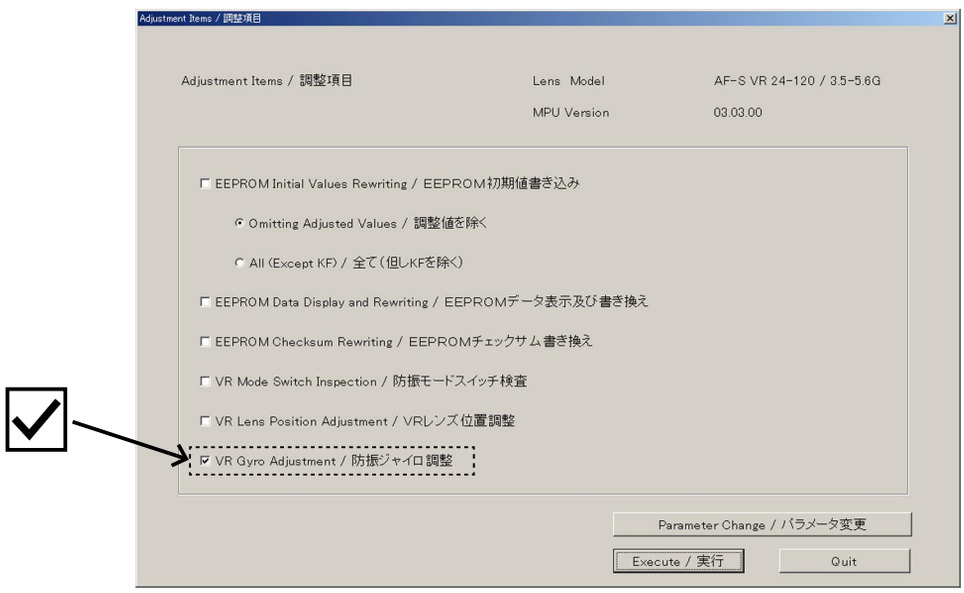
If [NG] is shown in the middle of the adjustment, click the Next button. This makes it possible to evacuate from the inspection mode and to go back to the Lens Selection window after rewriting the checksum value. Then adjust it again.

If it becomes be [NG] even performing the adjustment a few times, the VR unit, the gyro PCB or the main FPC might be defective.

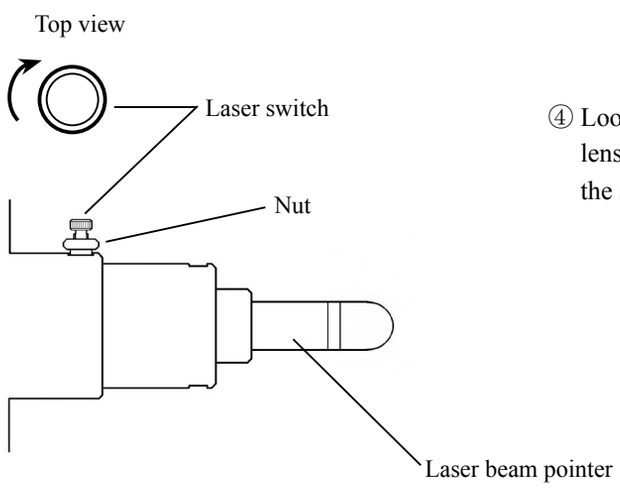
VR GYRO ADJUSTMENT

① Move the cursor to a box in front of [VR Gyro Adjustment] and click it to mark the check marking.

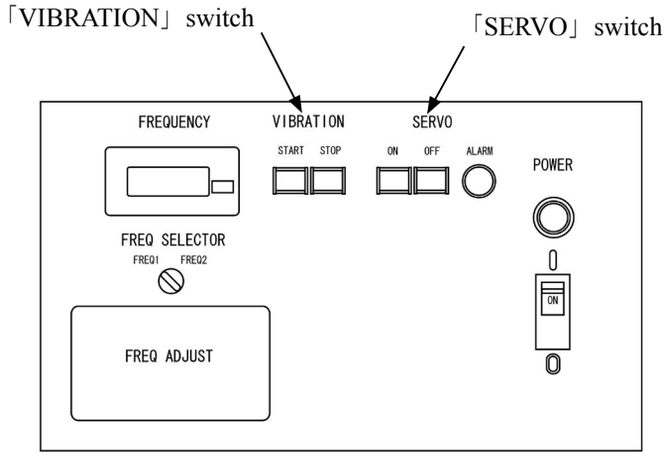
② Move the cursor to the Execute button and click it.


Adjustment Items / 調整項目
Adjustment Items / 調整項目
Lens Model
AF-S VR 24-120 / 3.5-5.6G
MPU Version
03.03.00
EEPROM Initial Values Rewriting / EEPROM初期値書き込み
Omitting Adjusted Values / 調整値を除く
All (Except KF) / 全て(但しKFを除く)
EEPROM Data Display and Rewriting / EEPROMデータ表示及び書き換え
EEPROM Checksum Rewriting / EEPROMチェックサム書き換え
VR Mode Switch Inspection / 防振モードスイッチ検査
VR Lens Position Adjustment / VRレンズ位置調整
VR Gyro Adjustment / 防振ジャイロ調整
Parameter Change / パラメータ変更
Execute / 実行
Quit

③ The message like a picture on the left is shown. Set it to the Telephoto settings.

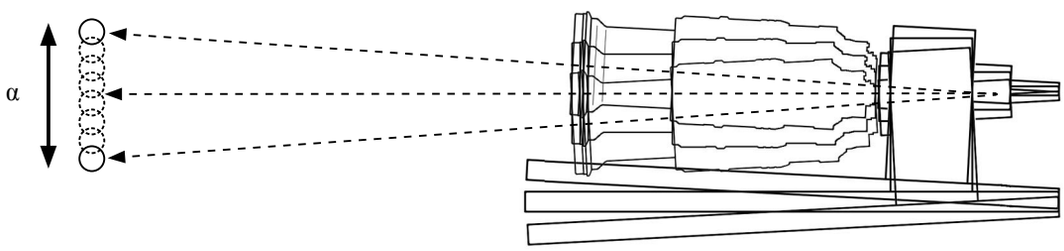


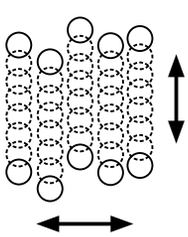
④ Loosen the nut of the laser switch of the VR lens adjustment equipment (J15380) and rotate the screw in an arrow direction to give the laser.



⑤ Press the SERVO [ON] button and the VIBRATION [START] button of the VR lensadjustment equipment (J15380).

⑥ With the equipment starts to vibrate, measure the length of the vibration width a of the laser beam.





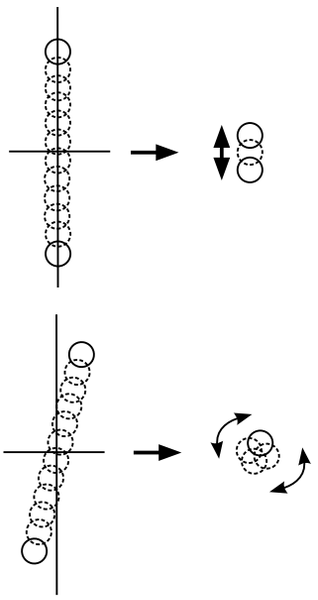
Notes : The phenomenon that the laser spot light shakes up and down, right and left occurs during measuring the vibration width.

This is the motion of the VR unit control and is not defective.

⑦ Move the cursor to the Next button in the message box on the screen and click it.

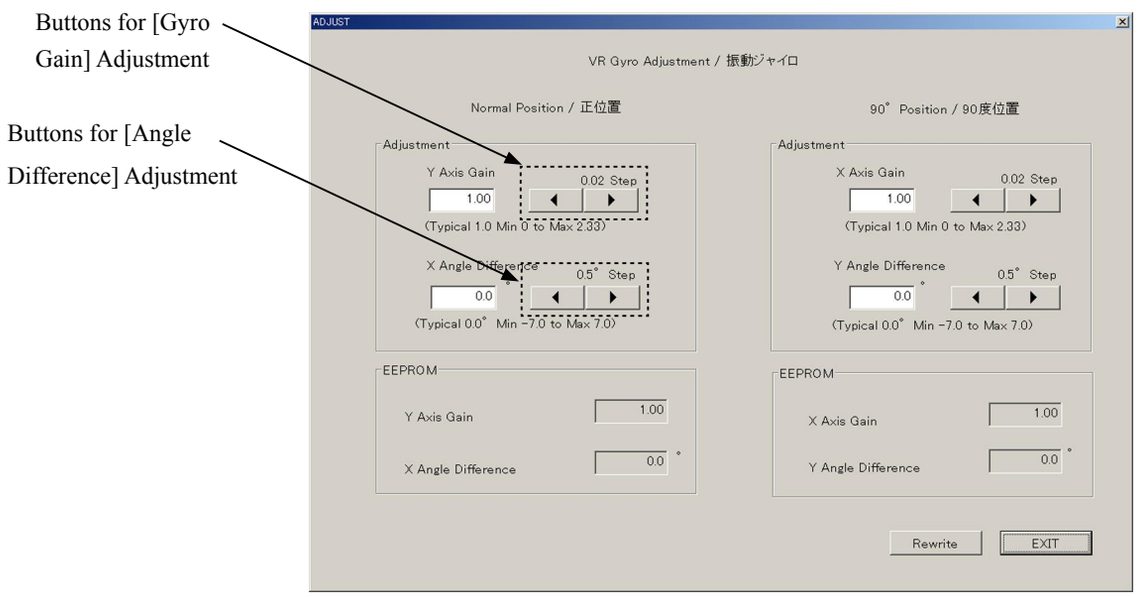
Vibration reduction function starts to perform and the vibration width of the laser beam becomes be narrow.

・Angle Difference Adjustment



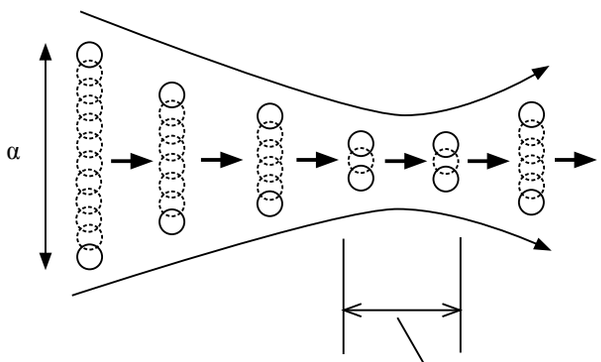
If there is angle difference, the laser beam source becomes be whether if it rotates round even performing the Gyro Gain Adjustment.
If it is possible to confirm the angle difference, adjust it by the buttons for the angle difference adjustment.

Notes：After operating the adjustment button, wait for a few seconds until a vibration motion is stabilized.



・Gyro Gain Adjustment

Adjust the vibration width by the button for Gyro Gain Adjustment so that the length of the vibration width becomes be less than 1/5 of the measured laser vibration width a.

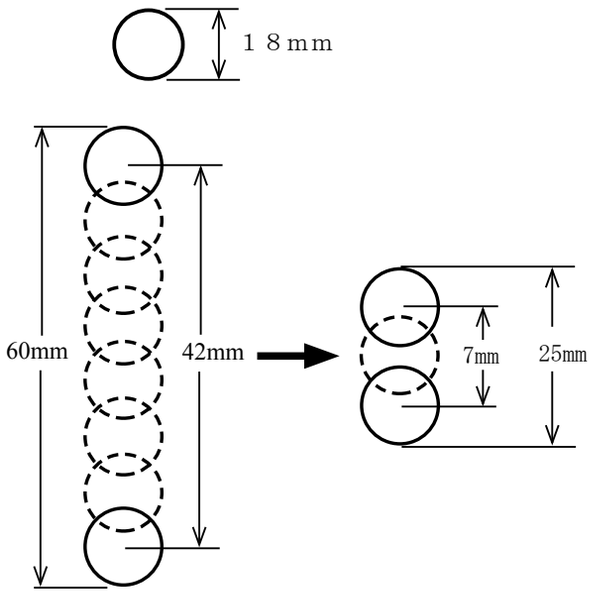


Standard: Less than 1/5 of the vibration width a

Notes：The laser beam vibrates widely again after it passes the peak section of the minimum value.

《Reference》

・The laser spot beam is irradiated about 18mm in diameter at 5 m ahead.



① To adjust the vibration width at the center of the laser spot beam, measure the whole vibration width first.

② Subtract the radius of the laser spot (oblique lined part) from the top and bottom of the measured vibration width.

Example）
When the whole vibration width is [About 60mm], the center vibration width becomes be
60 - (9 + 9) = 42mm.

Standard after the gyro gain adjustment
40 × 1/5 = 8.4mm (Center vibration width)
Whole vibration width becomes be
7+ (9+9) = 25mm.

・How to obtain the minimum value of the vibration width

① Measure the vibration width while changing the adjustment value that is set every 0.02Step as shown below.

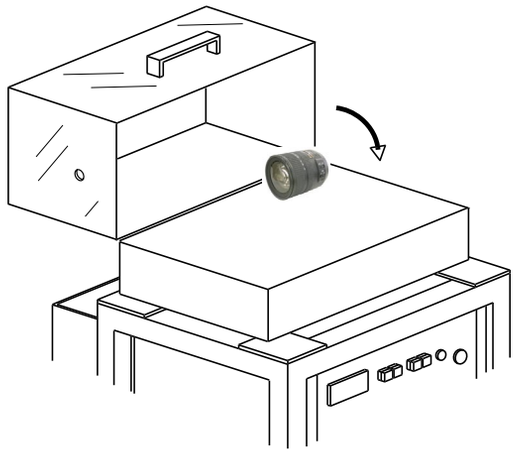
② The peak section of the minimum vibration width can be obtained by the actual measured value.

③ Take the center of the peak section as the adjustment value.

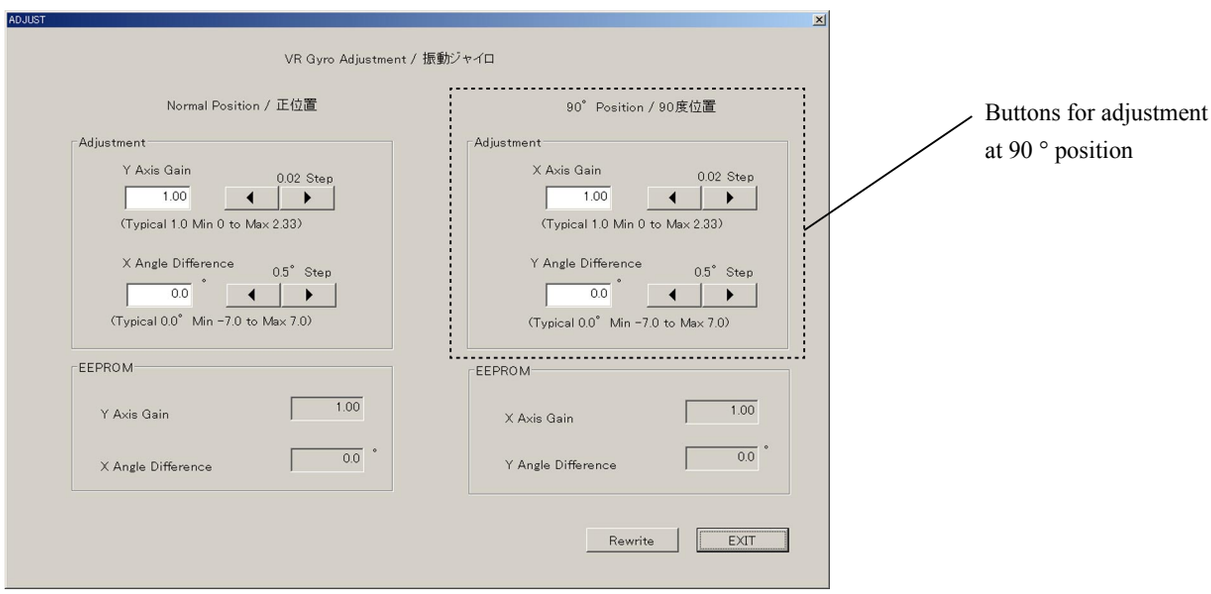
Gyro Gain Adjustment Value	Vibration width Actual measured value
・	・
・	・
０．９０	１６．５mm
０．９２	１６．０mm
０．９４	１５．５mm
０．９６	１５．０mm
０．９８	１４．５mm
１．００	１４．５mm
１．０２	１４．５mm
１．０４	１５．０mm
１．０６	１５．５mm
１．０８	１６．０mm
１．１０	１６．５mm
・	・
・	・

Notes : When measuring the vibration width, read it in unit of 0.5mm.

・Rotate the lens 90 ° in an arrow direction and then adjust the angle difference and the gyro gain.



Notes : When adjusting the lens at 90 ° position, adjust it by the buttons for the adjustment at 90 ° position as shown in Figure below.



Buttons for adjustment at 90 ° position

・After the adjustment, click the [Rewrite] button to write the adjustment value in EEPROM in the lens.

・Then, click the [EXIT] button to evacuate from the adjustment mode.

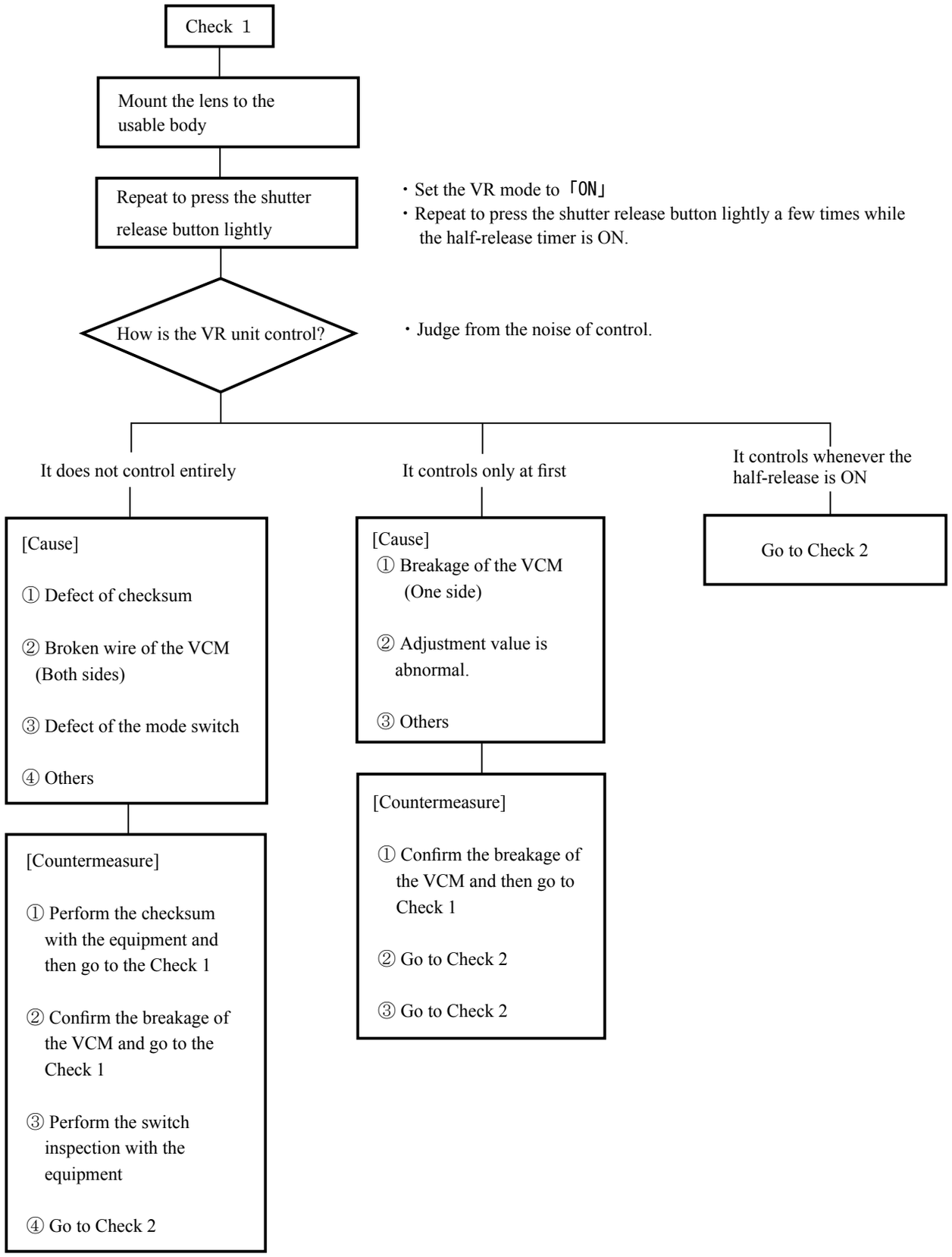
Notes : If clicking [EXIT] button after not clicking the [Rewrite] button, the adjustment value is not stored and the adjustment is not influenced.

・Click the [Quit] button at the Adjustment Items window to go back to the Lens Selection window.

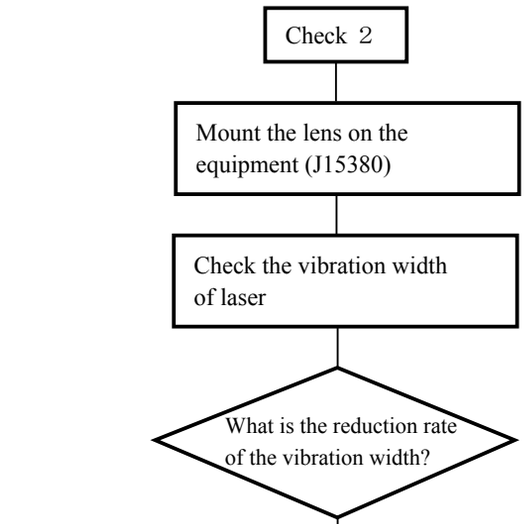
Notes : Do not remove the lens or turn OFF the VR lens adjustment equipment until it goes back to the Lens Selection window. The trouble that the adjustment value is not stored correctly, etc. occurs since the communication is cut off.

STANDARD TO JUDGE THE VR PERFORMANCE

Please refer to the following chart before performing the VR adjustment for the product of which VR is defective with the equipment.


Check 1
Mount the lens to the usable body
Repeat to press the shutter release button lightly
・Set the VR mode to「ON」
・Repeat to press the shutter release button lightly a few times while the half-release timer is ON.
How is the VR unit control?
・Judge from the noise of control.
It does not control entirely
It controls only at first
It controls whenever the half-release is ON
[Cause]
① Defect of checksum
② Broken wire of the VCM (Both sides)
③ Defect of the mode switch
④ Others
[Countermeasure]
① Perform the checksum with the equipment and then go to the Check 1
② Confirm the breakage of the VCM and go to the Check 1
③ Perform the switch inspection with the equipment
④ Go to Check 2
[Cause]
① Breakage of the VCM (One side)
② Adjustment value is abnormal.
③ Others
[Countermeasure]
① Confirm the breakage of the VCM and then go to Check 1
② Go to Check 2
③ Go to Check 2
Go to Check 2

Go on the next page [Check 2]


Check 2
Mount the lens on the equipment (J15380)
Check the vibration width of laser
What is the reduction rate of the vibration width?
More than 1/5
Less than 1/5

・How much does the vibration width reduce against those of when the VR mode is OFF and ON at the VR Gyro Adjustment.

[Cause]

① Adjustment value is not correct

② Others

[Countermeasure]

① Perform the lens position adjustment and the VR gyro adjustment

② The electric parts other than VR might be defective

The parts other than VR might be defective.

Aberration compensation data writing adjustment

・ This adjustment uses the software which calculates the aberration compensation data according to the feature of lens aberration and writes in EEPROM of the lens, in order to improve the accuracy of autofocus.

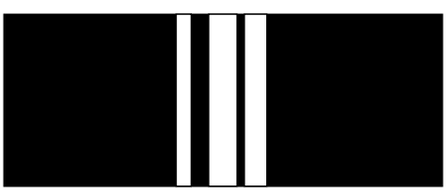
Note: This adjustment is necessary when the main PCB and/or each lens part (glass, lens chamber) is replaced or when each lens part is disassembled. Be sure to make this adjustment after completing inspecting and adjusting the main PCB.

(1) Preparation

- Test chart (Self-made tool: ref. Procedure for how to create it.)
- Tripod
- D100
- Personal computer
- USB cable（UC-E4）
- Adjustment software (LWM.exe：used for the lens optical alignment.)

(2) Procedure for how to create Test chart

- Photocopy the next page and cut out 1 target chart and 5 resolution charts.

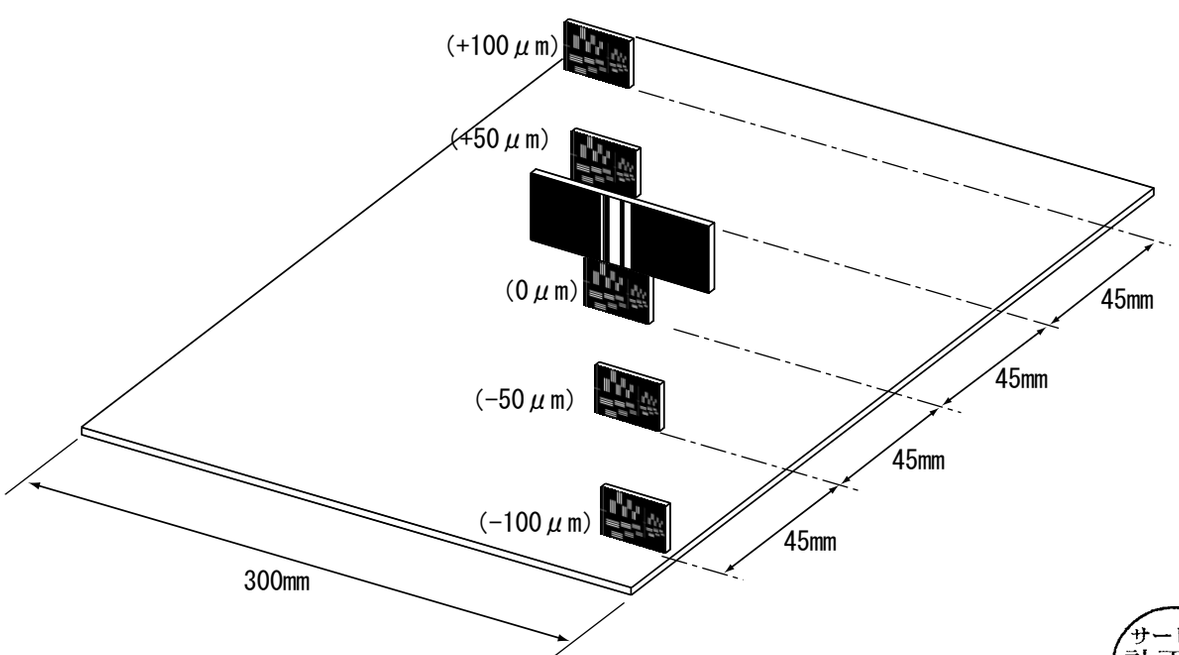


(Target chart)

(Resolution chart)

- As shown below, put each chart in position at the specified spacings.

  Note: Only about the center, put the target chart on the central resolution chart.



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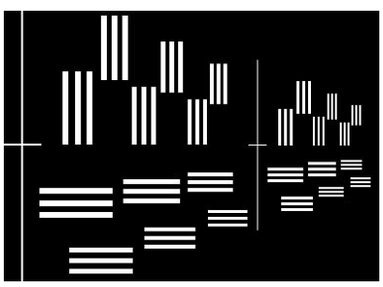
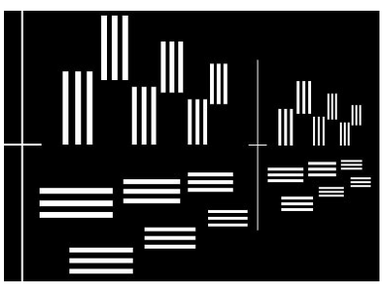
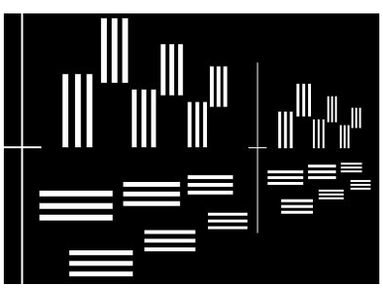
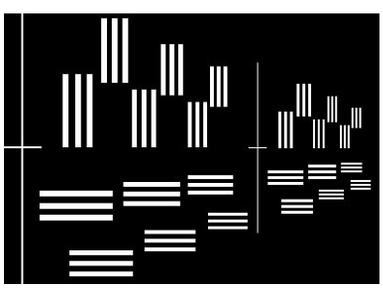
(Target chart)

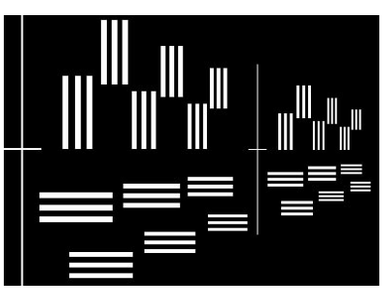
(Resolution chart)











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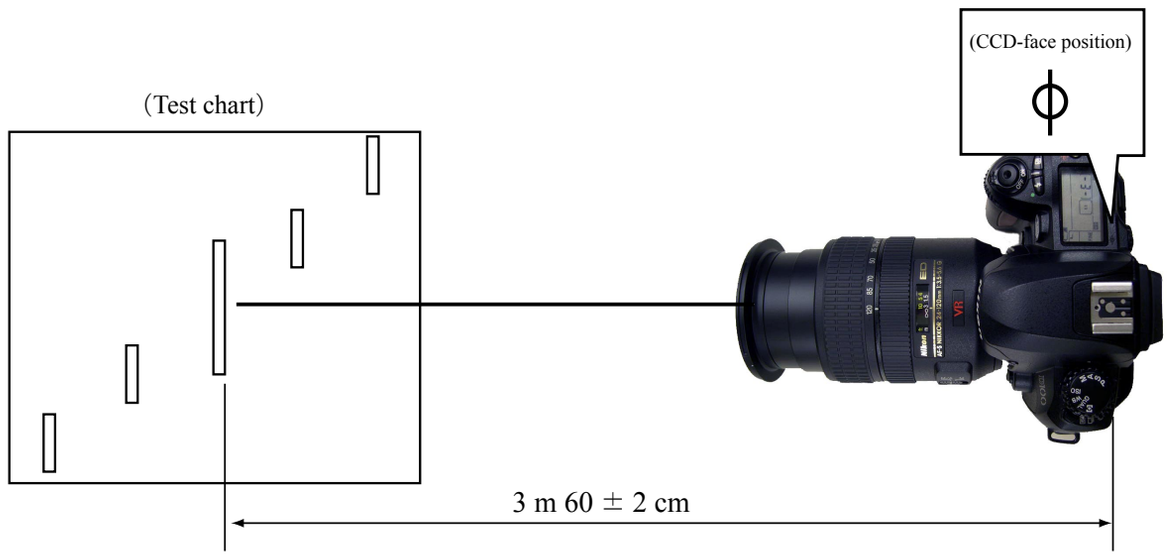
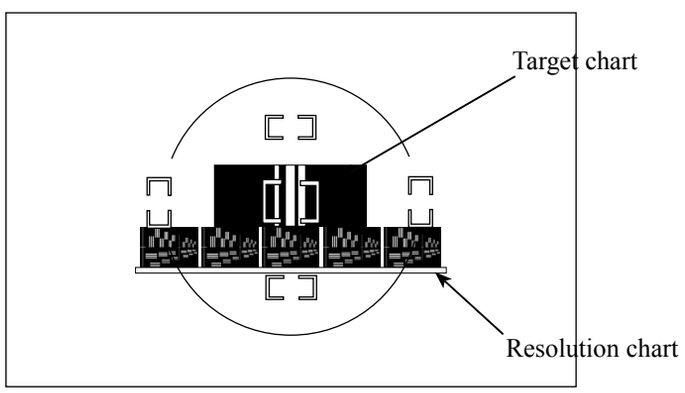
(3) Writing aberration compensation data

① Prepare a camera (D100). Set the "Exposure mode" to "A" for full aperture and "Focus mode" to "S". On the shooting menu, set the "Image quality mode" to "FINE", "Image size" to"L", "WB" to "Preset", and "ISO" to "200".

② Set up the camera (D100), in which the lens to be inspected is fit, on the tripod. Set the focal length to 120 mm, and the distance between the test chart and camera (CCD face) to 3 m 60±2 cm.



③ As shown below, bring the target chart in the center of focus area within viewfinder.



(Within viewfinder)

④ Connect the PC and camera via USB cable. (Camera setting: Mass storage)

⑤ Start the adjustment software (LWM.exe).

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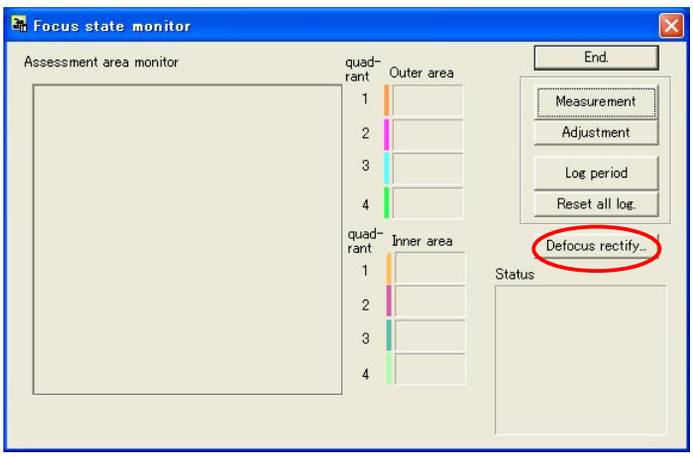
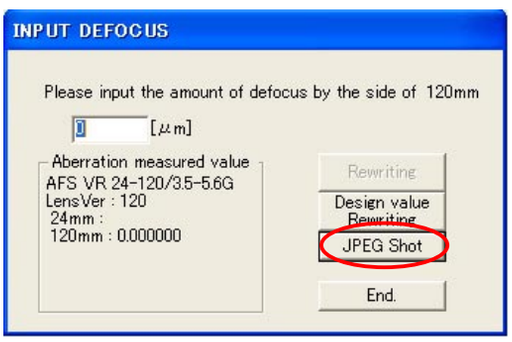
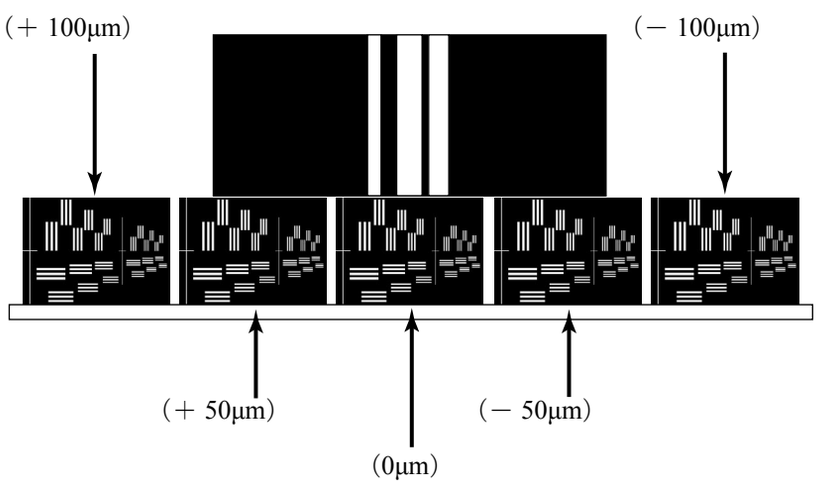
⑥ Click the "Defocus rectify..." button.



⑦ Click the "JPEG Shot" button.

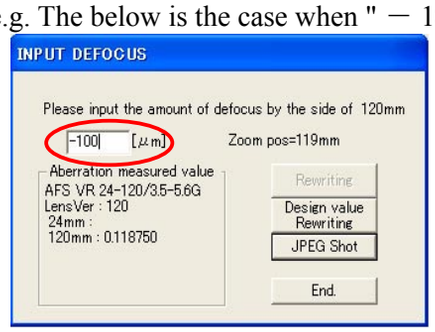


⑧ The shutter is released after the AF operation. The shot image is automatically displayed on the PC screen. Scale the image to 100% and check which chart is in focus of the 5 resolution charts.



⑨ Input the value of the focused position into the entry field.

e.g. The below is the case when " − 100μm" of the front focus side is in focus.



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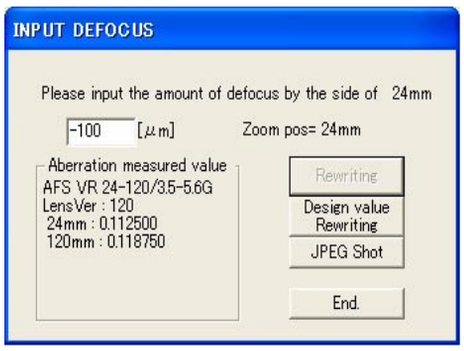
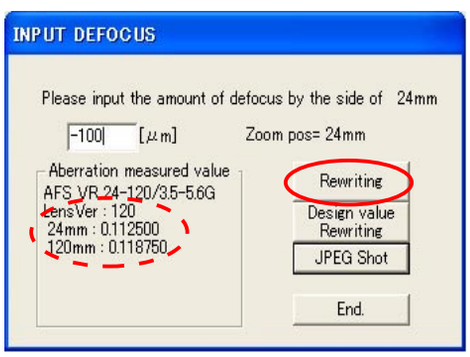
⑩ Set the focal length of the lens to 24 mm, and the distance between the test chart and camera (CCD face) to 72 ± 2 cm.

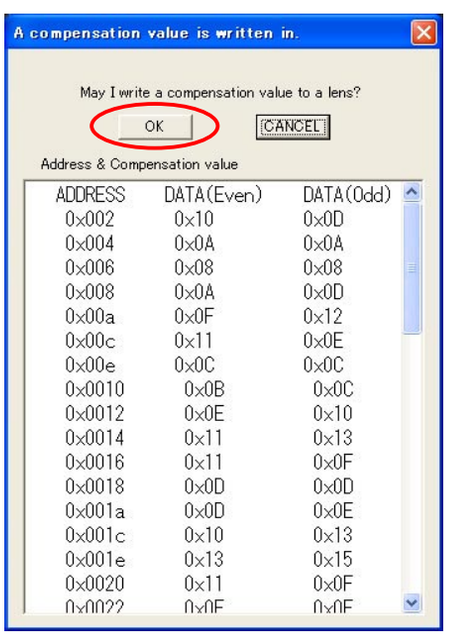
⑪ Perform the operations from ⑦ to ⑨ of the previous page.



⑫ Check that the values of all the focal lengths are displayed within the dotted red circle. Then click on "Rewriting".



⑬ When "A compensation value is written in." is displayed, click "OK".



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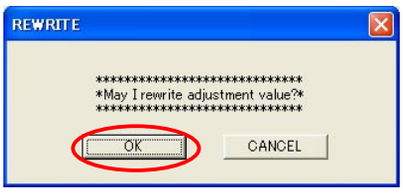
⑭ The reconfirmation screen is displayed. Click "OK".

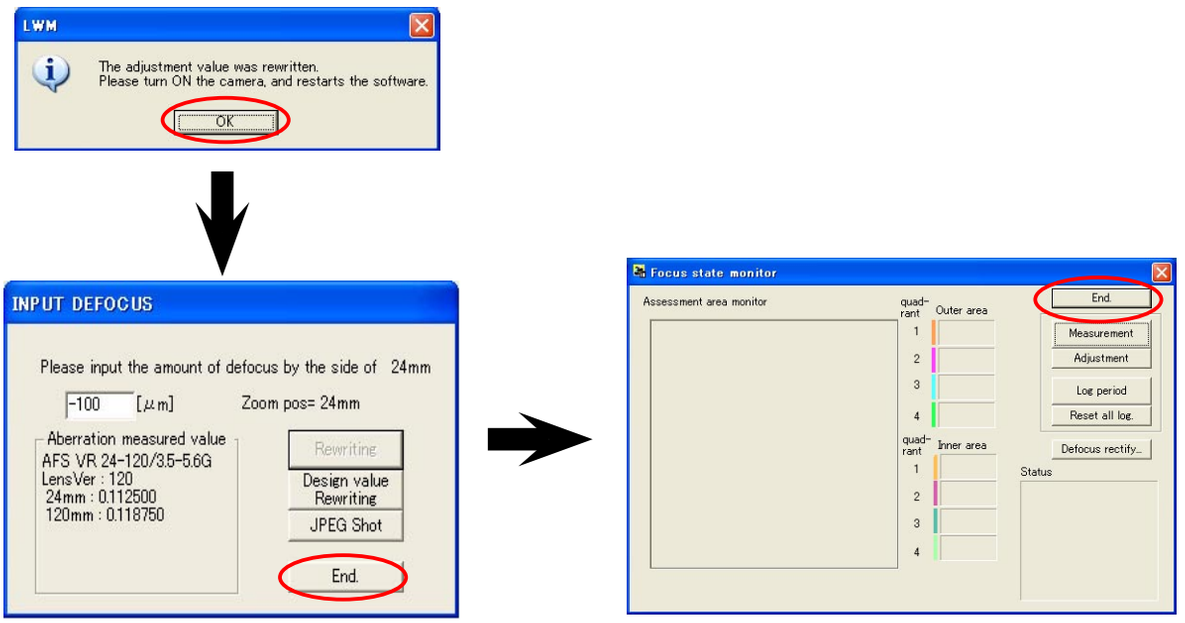


⑮ An hourglass is displayed on the screen, and writing starts.

The below screen is displayed after a few seconds. Turn camera OFF and turn it ON again.

Click "OK", and the adjustment software restarts.

Note: Unless the camera is turned off once, the value that was written in EEPROM is not reflected on the results of shooting.

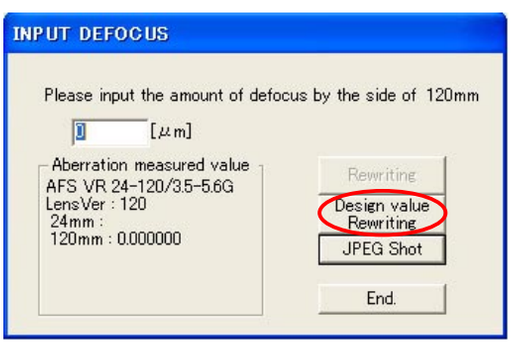


⑯ When the adjustment software restarts, perform the operations from ② to ⑪ again. Check that "0μm" of the AF position is in focus.

(It is also possible, after Wide-side shooting of ⑩, to take the Tele-side shooting of ②.)

If "0μm" is not in focus, repeat the operations from ② to ⑯.

If it is not still in focus even after repetition, the written value in EEPROM may be abnormal. So click "Design value Rewriting" to write the initial value, then proceed with the operations.



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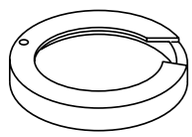
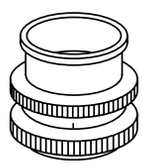
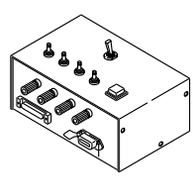
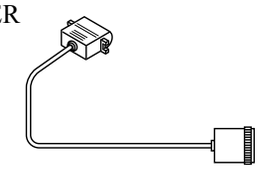
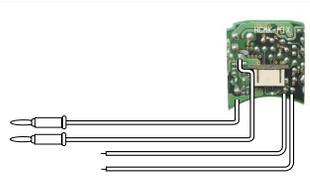
Tools

★ : New tool

RJ No.	Name	Note
MZ-800S	DRY SURF MZ-800S	
GE-8	GREASE GE8	
EDB0011	SCREW LOCK 1401C	
J18004-1	STANDARD GAUGE FOR J18004 	
J19002	BACK FOCUS COLLIMATER LT-500S	
J18028	LENS ADAPTER FOR FOCUS TESTER 	
J18342	AF-S ZOOM LENS (NEW)INSPECTION AND ADJUSTMENT SOFTWARE	Use the version date after May 10 ,2003.
J15306 or J15306-1	AF-I COMMUNICATION BOX 	
J15307	AF-I COMMUNICATION ADADPTER 	
	PERSONAL COMPUTER	
	POWER SUPPLY	
	OSCILLOSCOP	
	SELF-MADE TOOL 	Use the self-made tool that was created in AF-S24-85/3.5-5.6G or AF-S DX12-24/4G.
J15380A	VR LENS ADJUSTMENT EQUIPMENT	AC 100V
J15380B	VR LENS ADJUSTMENT EQUIPMENT	AC 200V
J15380-5	VR LENS INSPECTION AND ADJUSTMENT SOFTWARE	IBM 3.5inch

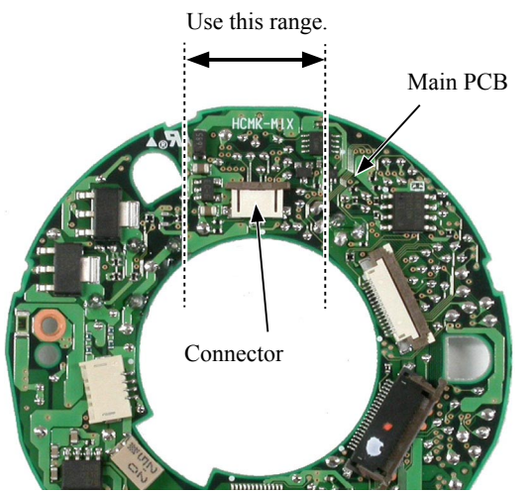
Making of self-made tool

●To inspect and adjust the output waveform of MR encoder, it is necessary to make a self-made tool by using the main PCB of repair parts.

The making procedure is shown below. Make a self-made tool according to this procedure.

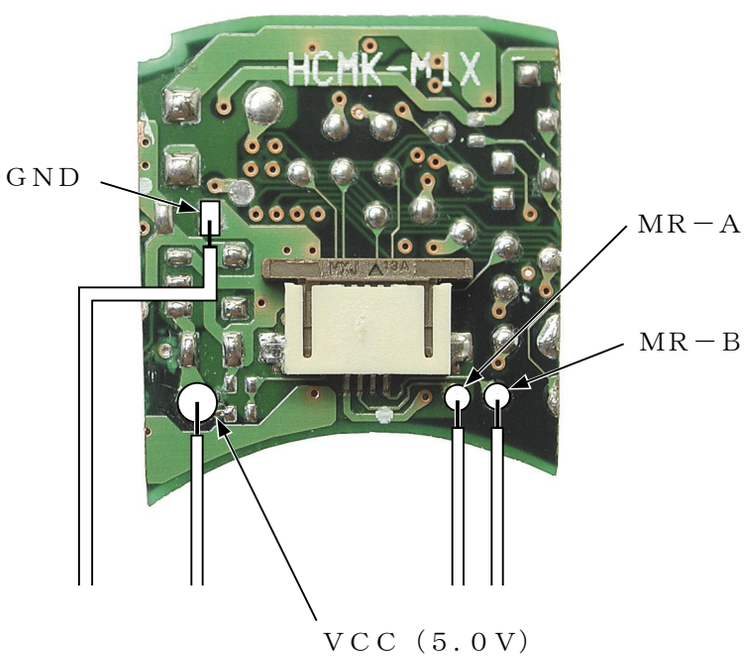
Use the main PCB for AF-S24-85/3.5-4.5G or AF-S DX 12-24/4G.

This tool is the same as the tool that was Self-made for AF-S24-85/3.5-4.5G or AF-S DX 12-24/4G.



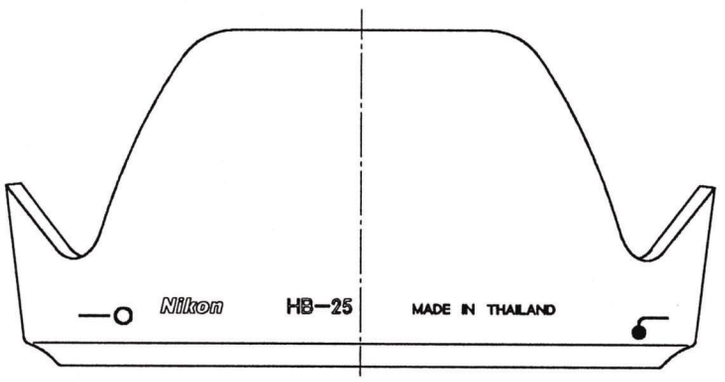
① Remove the elements (condenser, transistor, IC, etc.) installed within the dotted line as shown in the left from both sides of PCB. Don't remove the connector.

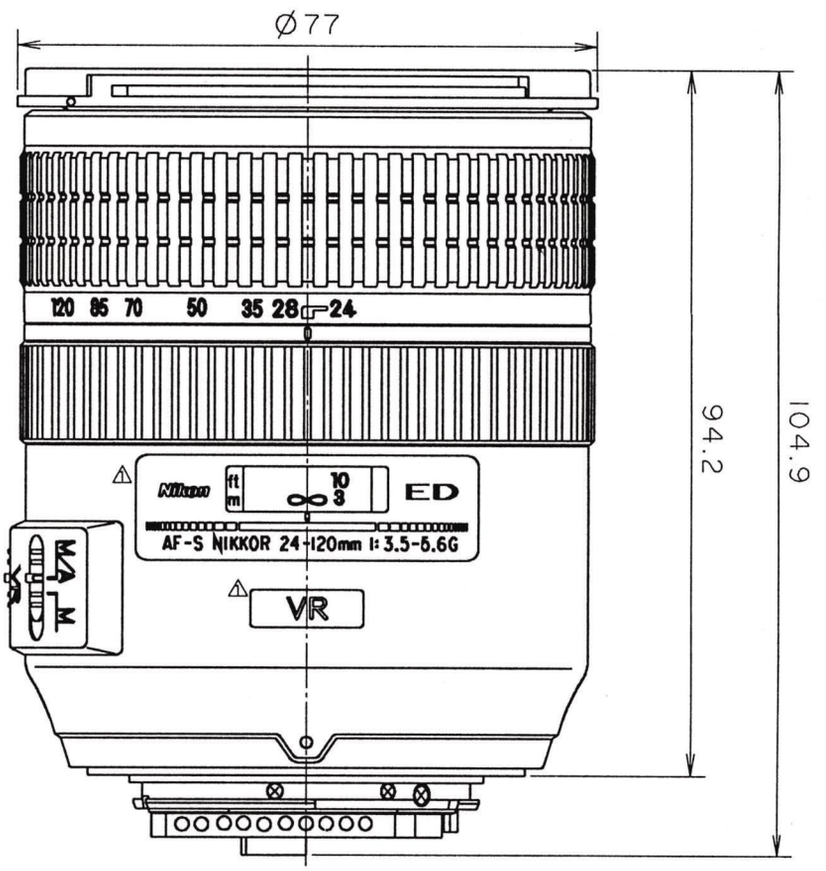
② Cut the PCB at the dotted line.



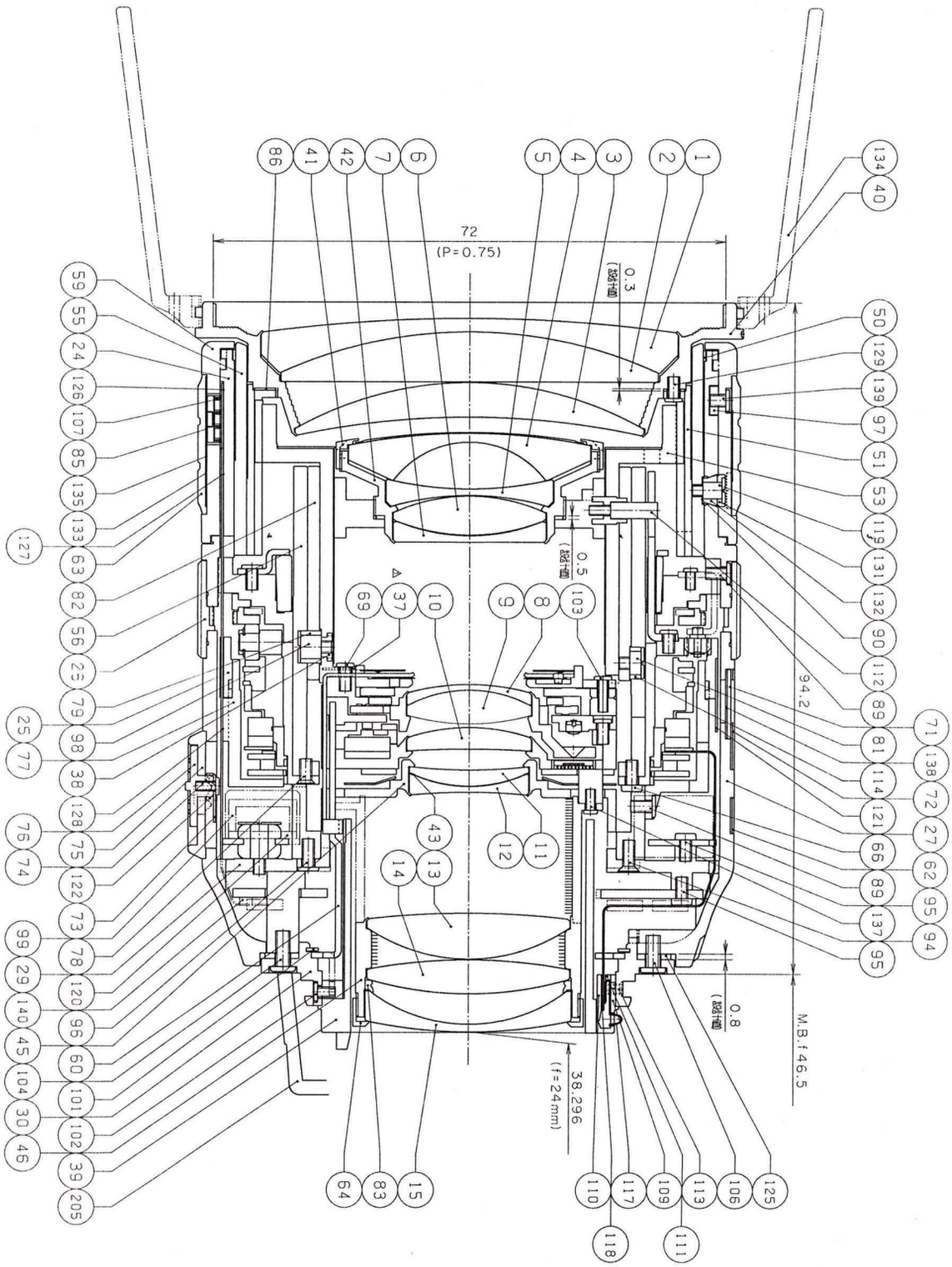
③ Solder the cords at 4 pattern places on the PCB as shown in the left.

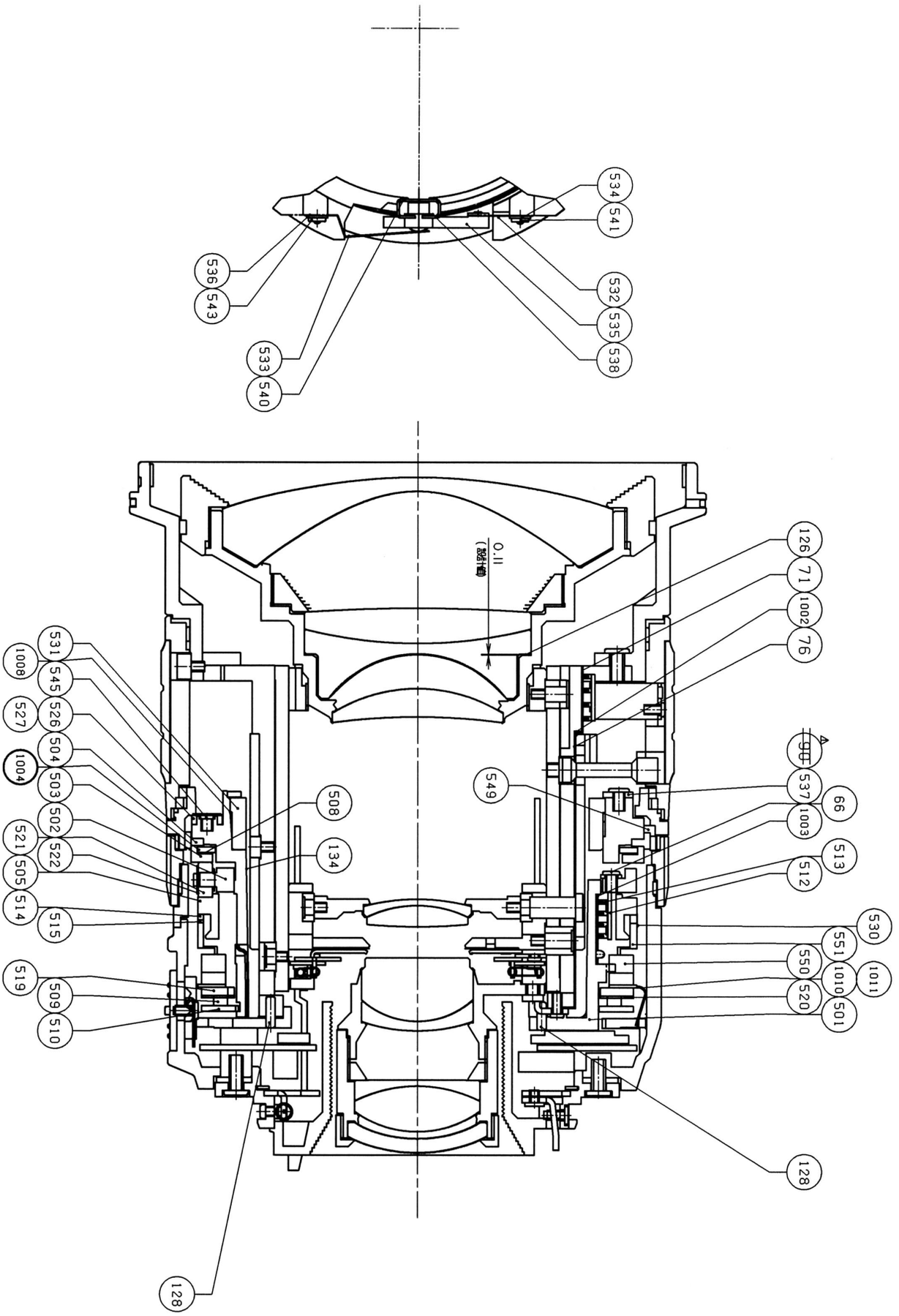
外観図 Sketch drawings





組立図 Structure of the Lens

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541
536
543
532
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538
533
540
0.11
(設計値)
126
71
1002
76
531
545
526
504
503
502
522
505
514
515
1008
527
1004
521
519
509
510
508
134
549
9
537
1003
66
513
512
530
551
550
520
1010
501
1011
128
128

実体配線図
WIRING DIAGRAM